PAVED RECREATION TRAILS OF THE NATIONAL CAPITAL REGION

Recommendations for Improvements and Coordination to Form a Metropolitan Multi-Use Trail System

Washington, D.C.

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June, 1990

Prepared by

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in cooperation with
Recreation Resources Assistance Division
Washington Office

National Park Service
United States Department of the Interior

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ILLUSTRATIONS

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Acronyms

AASHTO	American Association of State Highway and Transportation Officials
C & O	Chesapeake and Ohio
CFR	Code of Federal Regulations
CHOH	Chesapeake and Ohio Canal National Historic Site
COG	Council of Governments
CSX	Georgetown Branch Railroad Corridor
DOT	Department of Transportation
FHWA	Federal Highway Administration
FLHP	Federal Lands Highway Program
GWMP	George Washington Memorial Parkway
M-NCPPC	Maryland-National Capital Park and Planning Commission
MUTCD	Manual of Uniform Traffic Control Devices
NACC	National Capital Parks – Central
NACE	National Capital Parks – East
NCPC	National Capital Planning Commission
NCR	National Capital Region
NPS	National Park Service
ROCR	Rock Creek Park
WABA	Washington Area Bicyclist Association
WB&A	Washington, Baltimore, and Annapolis (Railroad Corridor)
W&OD	Washington and Old Dominion (Railroad Corridor)
WMATA	Washington Metropolitan Area Transit Authority

SUMMARY

Over the past 20 years, bicycling, jogging, and hiking have grown in popularity and become serious pursuits for thousands of people in the metropolitan Washington, D.C. area. With this growth has come a dramatic increase in demand for urban trails. The National Park Service (NPS) has responded to that demand by constructing more than 75 miles of paved trails in five park management areas in the region – George Washington Memorial Parkway, Chesapeake and Ohio Canal National Historical Park, Rock Creek Park, National Capital Parks--Central, and National Capital Parks--East. Now, in 1990, the Park Service faces a major opportunity to build on its successes. It can play a major role in creating a larger, better linked system of urban trails more than 1,000 miles long that would serve a significant percentage of the region's neighborhoods, parks, and tourist attractions.

As a setting for recreation, the metropolitan area of Washington is unique for a variety of reasons: an extensive federal urban park system; a climate that allows outdoor activity every month of the year; gentle topography; a well-educated, comparatively wealthy mobile population; and a city center known for wide streets. Some of the area's recreational clubs and groups are the largest of their kind in the nation, such as the Potomac Pedalers Touring Club, the Washington Area Bicyclist Association, and the Potomac Appalachian Trail Club. These groups provide the opportunity for active partnership with the federal government to enhance the area's recreational potential.

The purpose of this special study is to assess current trail and trail system conditions, and recommend steps the Park Service can take to help improve existing trails and create an integrated, interjurisdictional network of urban trails.

This study therefore describes the current condition of the many NPS, local governmental, and regional jurisdiction trails that already exist. It assesses other current conditions as well, exploring the issues of use, safety, legality, and management policy that affect the design and use of trails. It groups the major challenges that stand in the way of trail improvement and expansion. It concludes with two sets of recommendations. The first set recommends approaches to system design, trail design, and information systems. The second, which groups and prioritizes specific construction projects, calls for the creation of six linked trail loops and describes in detail 11 projects that have top priority.

Current Conditions on Trails

As the Park Service has been developing trails, so have many of the cities and counties in metropolitan Washington, and the region is also tied into several regional trails. Though the National Park Service's Mount Vernon Trail is in generally good condition, the condition of most of the other trails is only fair or poor. Great as the potential is to make NPS trails the nexus of a system that extends into and links jurisdictions around the nation's capital, many of the trails that now exist are incomplete, uncomfortable for users, and, in some cases, unsafe.

Other Current Conditions

Although statistics on the use of Washington's trails are sketchy, it is clear that use continues to rise. Heavier use intensifies the potential for conflict between different types

of trail users (and between trail users and motorists) and makes correcting unsafe trail conditions more urgent. That trails are "highways" in legal terms defines the liabilities of the public agencies that build and manage trails. Good maintenance is essential to avoiding accidents and attendant liability. But maintenance is, in fact, less complete than it should be on many Washington trails and funding for trail construction, though potentially available from a number of sources, has come primarily from the operations budgets of individual parks.

Challenges

Two of the greatest challenges are the discontinuities that keep trails in the Washington area from forming a coherent system and an overabundance of trails that are substandard in design. Trails are often too narrow and poorly marked (lacking center lines and edge stripes). Information systems (signs, maps, brochures) are often too rudimentary or non-existent.

Recommended Policies and Programs

The report recommends these refinements of the NPS Management Policies.

> The Service is encouraged to *disperse* use of its metropolitan-area trails by developing scenic trails in other locations.
>
> Trail systems should be designed to accommodate the recreational needs of the *major types of users*, addressing such factors as trip length, speed, and support services. Heavily used trails near the city should be wider than less used trails farther out.
>
> Where adequate land is available and environmental impacts will not be adverse, trail types should be *separated* to minimize conflicts between cyclists and pedestrians. Where uses must combine on one paved trail, accommodating measures should be taken, such as widening the trail to at least 10 feet.
>
> A consistent *sign system* should be installed on NPS recreational trails in metropolitan Washington, D.C. The system should offer route directions, warnings, and interpretive information. Signs should be coordinated with other jurisdictions at key intersections and access points.

Other recommendations address further specifics of designing trail systems, trails, and information systems. The need to plan trails in their entirety, following accepted standards for grade and curvature, receives special attention, as does the need for sufficient and uniform trail width, unbroken pavement, and centerline and edge striping.

The recommendations for management call for expanding cooperation both with other jurisdictions and with trail users, specifically to plan in advance and in a comprehensive manner. A consistent management program for regular trail inspection, evaluation and reporting is also proposed. The recommendations for maintenance emphasize the need for more regular maintenance, and cooperation on issues of maintenance.

Recommended Construction Projects

The major recommendation of this study is that the National Park Service work toward upgrading the overall quality of the natural capital area trail system by creating six interlocking loop trails. Also recommended are a large number of specific projects, many of which would help achieve the creation or improvement of the loop trails. Of the specific projects, 11 have been identified as highest in priority on a region-wide level and are described in detail.

The following are the recommended loops and the trails which would comprise them.

The Arlington Loop. Custis Trail, Four Mile Run Trail, and Mount Vernon Trail along the Potomac shoreline.

The Alexandria Loop. Braddock Road, Holmes Run, and the Mount Vernon Trail along the Alexandria waterfront.

The Little Falls/Rock Creek Loop. Capital Crescent Trail connecting to Rock Creek Trail in Chevy Chase and to the Chesapeake & Ohio (C&O) Canal towpath downtown.

The Capital Crescent/Sligo Loop. Through the Maryland suburbs on the Capital Crescent Trail, Silver Spring, Sligo Valley, Northeast Branch Valley, the Anacostia shoreline, and Mall trails (connecting to the C&O Canal towpath, the Greenbelt connector, and the Potomac Heritage Trail).

The Henson Creek/Oxon Run Loop. Fragments of trail joined with new trails along Suitland Parkway and the Potomac shoreline.

Potomac Shoreline Loop. Using bridges and shoreline trails on both sides of the Potomac from Key Bridge south to the Woodrow Wilson Bridge, this loop joins all the others.

These loops are illustrated on the map, Metropolitan Loop Trail System, page 2.

The following top priority projects were determined most important based on safety concerns, level of use, and potential for being a key trail connection.

1. Improve Columbia Island trails, especially Memorial and "Humpback" bridges.
2. Provide an alternative to the Zoo tunnel.
3. Resolve National Airport ramp conflicts.
4. Complete the northern section of Rock Creek Trail.
5. Replace the low-water bridge near Porter Street.
6. Improve the Broad Branch connector into Rock Creek Park.
7. Improve the airport barrier area trail segment.
8. Develop the "Georgetown Branch" rail trail in D.C.
9. Improve the Fort Circle Hiker-Biker Trail.
10. Improve the Lincoln Memorial Circle ramp crossings.
11. Include a trail connection across the Woodrow Wilson Bridge.

These projects and several dozen others are recommended for implementation. They are presented in a series of lists that organize the projects by differing variables to facilitate detailed planning and implementation by a variety of users of this study.

Some improvements are already under way. The report cites several of these encouraging signs of progress and concludes that this is a time of unprecedented opportunity for creating a system of urban trails that could be the finest in the nation.

I. INTRODUCTION

Linear recreation pursuits such as jogging, walking, and bicycling have become popular forms of sport and exercise during the past 20 years. As a result, there have been increasing demands for recreational systems that can accommodate this growing interest. In response to this demand in the Washington, D.C., area, the National Park Service (NPS) has installed more than 75 miles of paved recreation trails, a federally managed system many people consider a model for cities throughout the country.

Even though this system is of good quality, now is a time of unprecedented opportunity for improvement and expansion. A number of factors combine to create this opportunity. Support for creating a network of paved trails is growing in all political jurisdictions in the Washington area. Undeveloped park corridors, abandoned railroads, and unused "paper streets" are available for the expansion of the trail system so that use can be dispersed and the burden lessened on trail segments that are now over-used. The potential now exists to transform many existing trail fragments into the finest network of urban paved trails in the United States.

Residents of the Washington area and many of its visitors are, in general, well-educated, relatively affluent people who enjoy recreational trails. As a result, there are a number of private non-profit groups that have become established in the area who are willing to help the Park Service with planning, education, and trail safety. Sources of funds that could be used to improve and expand the trail system are various and underused.

REPORT PURPOSE

The purpose of this report is to enable the the National Park Service to take advantage of the opportunity it now faces. The report therefore examines existing conditions on the trails and off, discusses the challenges that must be met if those conditions are to improve, and recommends not only policies and programs but also a series of specific construction projects. Its geographical scope is limited to the metropolitan area of Washington, D.C., including the District of Columbia, Montgomery and Prince George's counties in Maryland, and Arlington and Fairfax counties in Virginia, plus the incorporated cities and towns in these counties.

Four major types of routes are generally found in a trail system: Rural touring routes, urban recreation routes, urban access routes, and an urban (usually on-street) network. The urban network tries to accommodate all types of trips and optimizes directness and safety. The access routes usually have specific purposes and destinations. Most of the trails under discussion here are urban recreation routes. These trails are distinguished from other types by heavy use, use for many different purposes, and wide fluctuations in use over time. A successful urban recreational route is accessible and convenient. It has an uninterrupted right-of-way, is attractive and safe, and relies on easy grades and curvature. The most successful and popular of Washington's existing paved recreational trails clearly exhibit these characteristics.

PROPOSED METROPOLITAN LOOP TRAIL SYSTEM

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STUDY GOAL

The goal of this study, and of its recommendations, is to increase the number of trails that meet these standards and to integrate paved trails into an area-wide network. More specifically, the study has these objectives:

To improve trail *continuity and consistency*. This can be brought about by developing a comprehensive regional trail program for both construction and maintenance that incorporates national standards into existing management programs.

To promote visitor *safety*, minimize risk, and reduce the opportunity for *liability* and tort claims against the federal government.

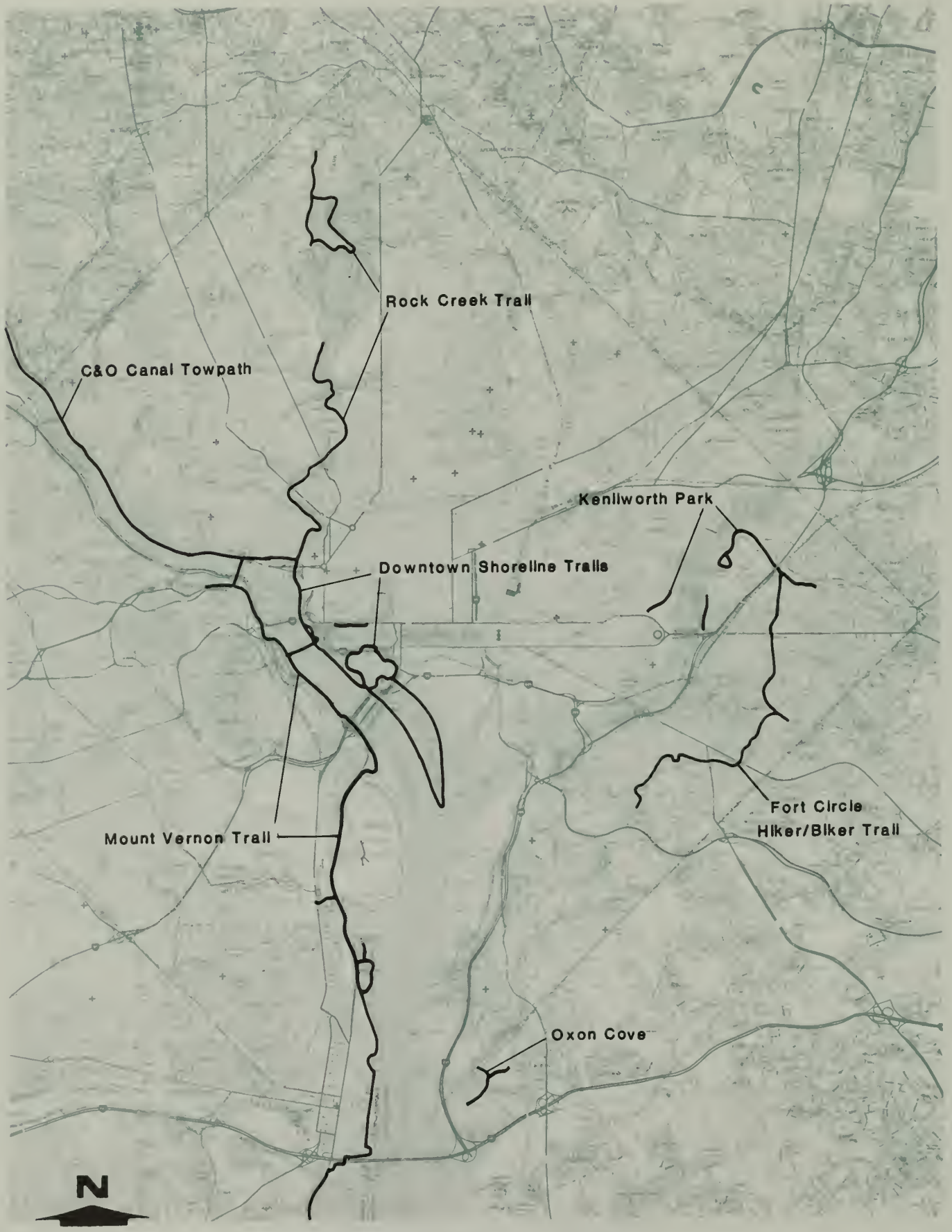
To reduce *conflicts between user groups* and others (including motorists) through design, education, information, and traffic control.

To foster *inter-agency cooperation* in trail planning, management, and protection.

To promote public use of *additional trails* where the impact of such use does not adversely affect the park environment.

To seek *funding* to rehabilitate and sustain trails.

This report includes information from other sources, most notably a report produced by the Washington Area Bicyclists Association, titled *National Capital Region: Bicycle Trails Evaluation and Recommendations*. WABA members also supplied some of the photographs included in this report. The Federal Highway Administration publication *Highway Route Designation Criteria for Bicycle Routes* also served as an important reference. A phone survey of seven cities (Boston, Boulder, Cleveland, Eugene, Madison, San Diego, and Seattle) produced additional information about trail system origins, size, design, use, conflicts, and management in other American cities. For a summary of this survey, see appendix A. Although numerous site-specific studies and design have been conducted to improve or correct the current network of NPS recreational trails in the Washington, D.C. area, never before this study has a comprehensive analysis of the system been conducted which also shows its relationship to other trails in the region.



Scale:
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EXISTING NPS TRAILS
OF METROPOLITAN WASHINGTON,D.C.

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II. CURRENT CONDITIONS: TRAILS

When Washington's largest park, Rock Creek Park, was established by Congress in 1890, it was already a popular spot for horseback riding and nature walks. With the advent of balloon tires for bicycles and automobiles in the late 19th century, all the carriage drives in and near the parks became favorite touring areas, as did the towpath of the Chesapeake and Ohio (C&O) Canal – which then was still in commercial operation. Only in 1969, however, did the federal government install paved off-road trails designed especially for bicycling.

Now the National Park Service manages 75.7 miles of trails in five areas. In addition to these federal trails, there are numerous local and regional trails. Conditions on the trails are too often marginal, and the trails are not yet a fully integrated system.

Nonetheless, existing trails in the metropolitan area are a resource of considerable potential. Federal and local trails and bicycle routes already form a network of several hundred miles. If they are completed as now planned, all the trails together could form a system well over 1,000 miles long.

CURRENT CONDITIONS OF FEDERAL TRAILS

The NPS trails in the nation's capital today fall within five park management areas: the George Washington Memorial Parkway (GWMP), the Chesapeake and Ohio Canal National Historic Site (CHOH), Rock Creek Park (ROCR), National Capital Parks--Central (NACC), and National Capital Parks--East (NACE).

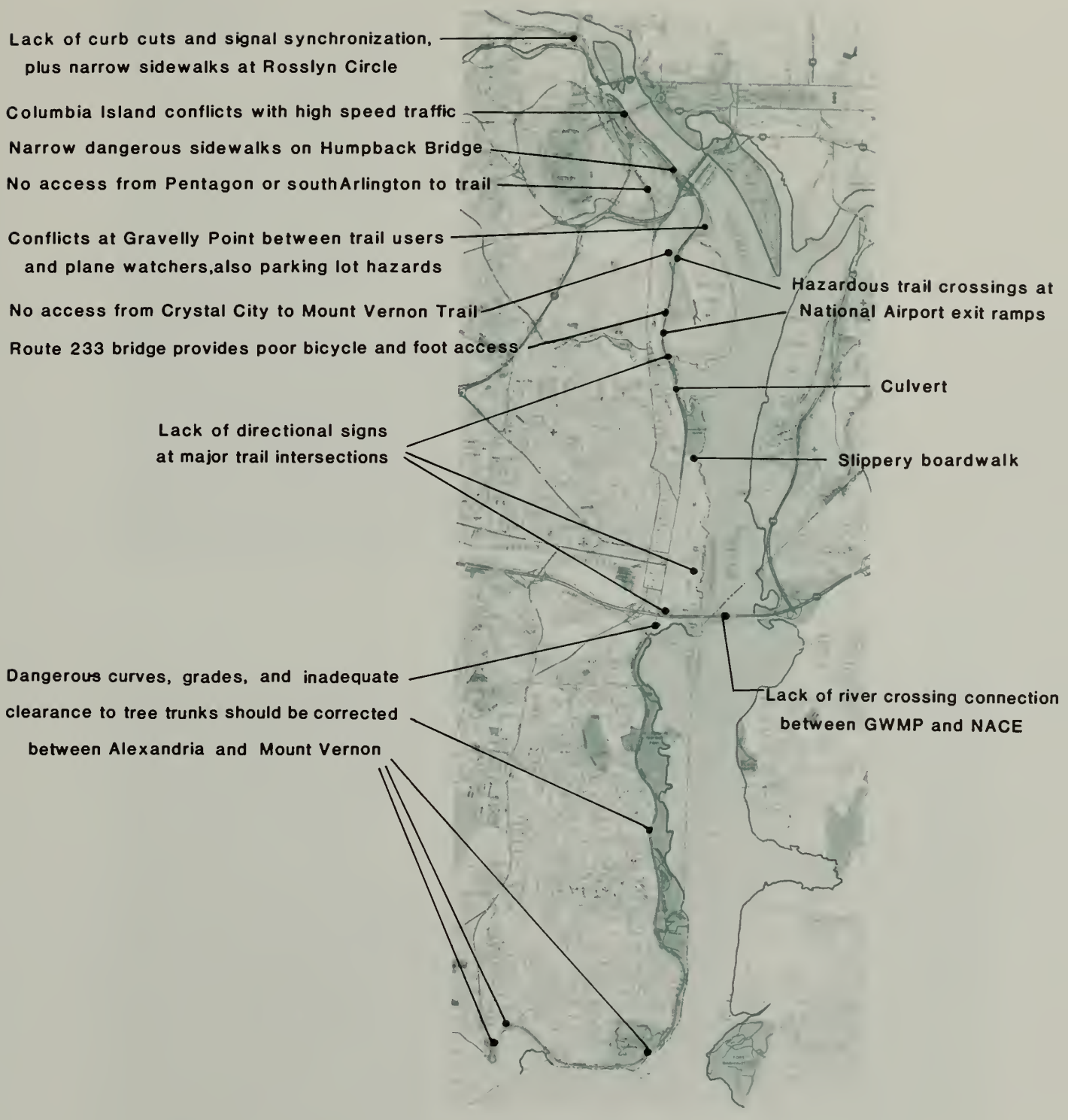
The longest trail, in the George Washington Memorial Parkway area, is the 18.5-mile long Mount Vernon Trail which follows the Potomac River shoreline south from Theodore Roosevelt Island to Mount Vernon. The 14-mile portion of the C & O Canal towpath included in the study follows the north side of the Potomac River west from the canal's southern terminus in Georgetown to Great Falls. In Rock Creek Park there are 8.5 miles of trail. These three longest and best known NPS trails together form over half the area's federal system.

According to a nationwide inventory of NPS trails completed in 1987, the condition of most of the paved trails in the Washington area is either "fair" or "poor." As is evident in the trail descriptions that follow, all of the NPS trails covered by this study exhibit problems. Some problems are caused by heavy use, some by poor design and construction, some by chronic lack of maintenance, some by other factors.

NPS Trails of the National Capital Region

The following list of Park Service trails in the study area (from Feldman and DeHaven, 1985) ranks the trails by trail length. The location of each trail is indicated by the appropriate NPS code letters. Major trails are also identified on the map, Existing NPS Trails of Metropolitan Washington, D.C., page 4.

Trail Name	Length in Miles	Park
Mount Vernon Trail	18.5	GWMP
C & O Canal Towpath (Georgetown to Great Falls)	14.0	CHOH
Rock Creek Park trails	8.5	ROCR
Fort Circle Hiker/Biker Trail	7.5	NACE
East Potomac Park Shoreline	4.7	NACC
Potomac Park Shoreline	2.6	NACC
Kenilworth Park	2.6	NACC
Anacostia Park	2.3	NACE
Fort Dupont	2.0	NACE
Tidal Basin Shoreline Walks	2.0	NACC
Mall	1.8	NACC
Oxon Cove Trail	1.5	NACE
Reflecting Pool Walkways	1.0	NACC
Mockley Point, Piscataway Park	1.0	NACE
Lincoln Drive	0.9	NACC
Constitution Avenue	0.9	NACC
Washington Monument Grounds Walks	0.9	NACC
Independence Avenue	0.8	NACC
D.C. Waterfront Park	0.7	NACC
River Terrace (south of Kenilworth Park)	0.5	NACE
15th Street	0.5	NACC
14th Street	0.2	NACC
Henry Bacon Drive	0.2	NACC
Daniel Chester French Drive	0.1	NACC
TOTAL	**75.7 miles**	



TRAIL PROBLEMS ALONG MOUNT VERNON TRAIL

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Currently the Virginia-side approach to the Theodore Roosevelt Bridge is substandard where the sidewalk ends suddenly and becomes an informal dirt trail (see Project G 33).

A wide and smooth trail surface plus a pleasant wooded setting make this one of the more attractive stretches of the Mount Vernon Trail.

Pedestrians, cyclists, joggers, and river watchers share the Mount Vernon Trail south of Alexandria.

The Mount Vernon Trail crossings at National Airport exit ramps are often difficult to cross due to the high speed and volume of traffic.

Mount Vernon Trail (GWMP)

In 1972 civic groups around Mount Vernon petitioned for a recreation trail along the Potomac shoreline within the George Washington Memorial Parkway. Initial sections, which were gravel, were paved by 1975, and the final section of the trail between Theodore Roosevelt Island and Memorial Bridge was built in 1988. In 1982-83, an imaginative project placed the Mount Vernon Trail between an electrical generating plant and the Potomac River north of Alexandria, with costs paid by a utility company facing legal action for storing coal on federal land. Now completed, the Mount Vernon Trail has become the "flagship" recreational trail in the nation, used to test materials and develop new trails standards.

Along the Mount Vernon Trail, problems range widely in scale and priority. Although a vigorous maintenance program has solved many of the worst problems, the trail receives such heavy use that even minor problems should be addressed. Conflicts with highspeed highway traffic occur at Memorial Bridge, the "Humpback Bridge," and the National Airport ramps. Trail links are missing or facilities are inadequate at Rosslyn Circle, Gravelly Point, Route 233, and at points south of Alexandria on the way to Mount Vernon. Nowhere are there adequate signs. Many of these specific problem areas are discussed in Section VI, Recommended Construction Projects.

Additional problems cited by the Washington Area Bicyclist Association (WABA), which has evaluated four NPS trails from the cyclist's perspective, include: lack of a safe parkway crossing at the south end of Columbia Island, conflict between trail users and motorists where the trail overlaps with parking on Gravelly Point, and lack of access between the trail and Crystal City.

C & O Canal Towpath, Georgetown to Seneca (CHOH)

Since the invention of the bicycle in the 19th century, the C & O Canal towpath has been a popular place to ride. After the federal government established the canal as a historic corridor and restored the towpath, local residents sought better access to it. About 1977, three spiral bicycle bridges were built in the Glen Echo area to carry pedestrians and cyclists across the Clara Barton Parkway and the canal to the towpath. Today the Canal extends 180 miles to Cumberland, Maryland. North of Seneca, Maryland, the towpath is often too rough for bike wheels. But between Seneca and Washington, D.C., it enjoys year-round use by many types of cyclists, walkers, joggers, and strollers.

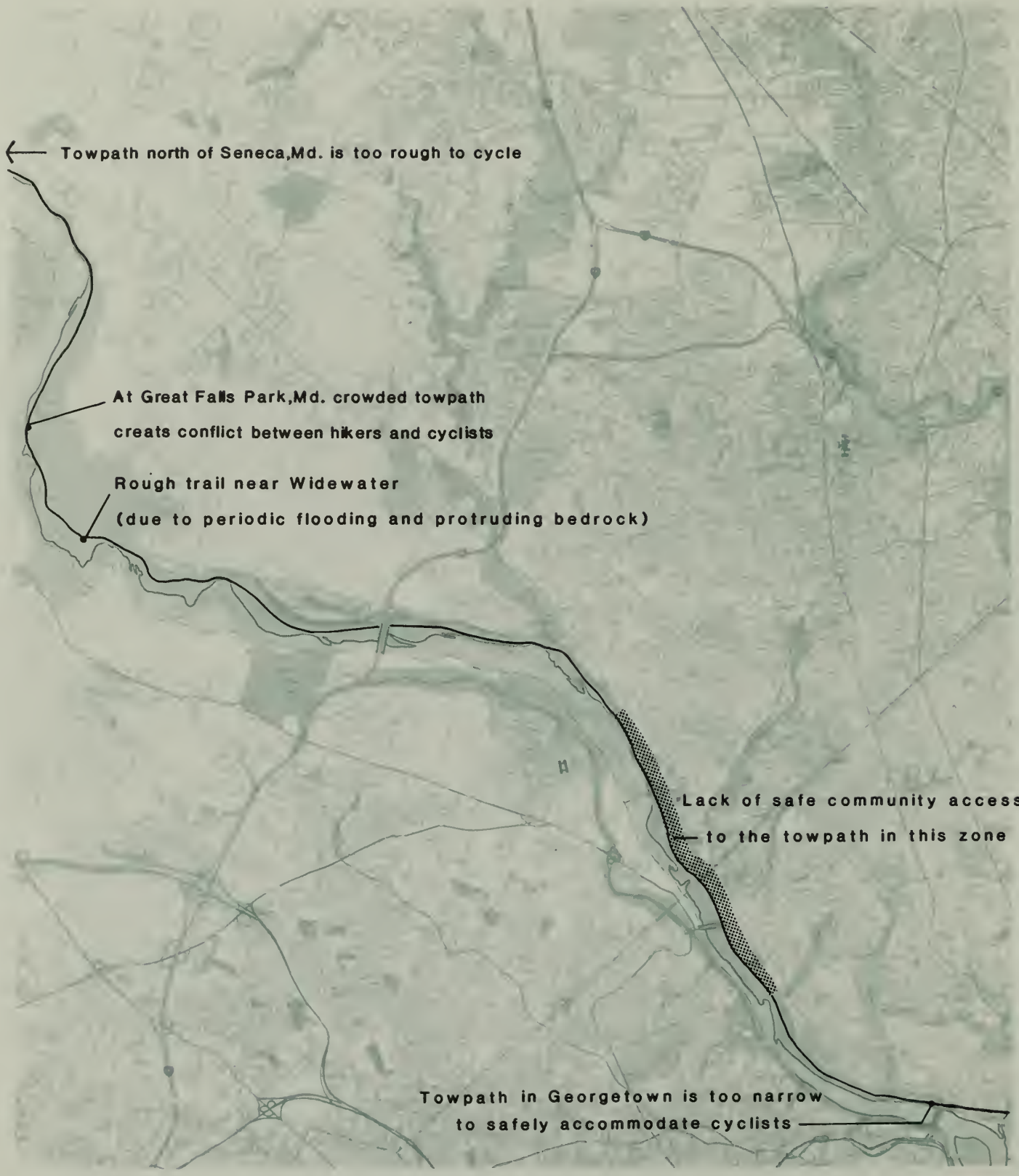
The C & O Canal towpath is unpaved, a compacted mix of gravel and clay. Some 300,000 cyclists are estimated to use the trail each year. Most accidents and conflicts occur near Georgetown where the towpath narrows, but visitation is highest. Floods have damaged the towpath surface near Great Falls. The locations of some of the problems are identified on the map, Trail Problems Along the C & O Canal, page 12.

Rock Creek Park (ROCR)

The first multi-use paved trails in the National Capital Region of the National Park Service were built in Rock Creek Park in 1969 – a loop system in the northern part of the park. In 1971 one lane of the Rock Creek and Potomac Parkway was closed to cars to accommodate cyclists coming downtown. But opening this lane to cyclists coincided with traffic back-ups caused by a broken water main. Public pressure to get bicycles entirely

This pedestrian and bicycle underpass is unfinished, but when completed will be an important connection between the high density residential and office development of Crystal City and the Mount Vernon Trail and National Airport.

This cantilevered trail, completed in 1983, provided a creative solution to connecting the Mount Vernon Trail in an industrial area north of Alexandria, Virginia.



TRAIL PROBLEMS
ALONG THE C&O CANAL

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off the road then released $50,000 in emergency funds, and a bridle trail between Thompson's Boathouse on the Potomac River and Cathedral Avenue was quickly paved.

According to Federal Highway Administration's (FHWA) recent *Engineering Study,* commuter traffic is the park's major problem. More than 24,000 cars have been counted along Beach Drive each day, in an area where 8,000 is the recommended maximum.

Further, the trails are narrow in congested areas, and there are no good trail connections to the sides and north end of the valley. The narrow clearance between the road and the creek makes the trail difficult to widen. On weekends, parts of the route are closed to automobiles. During the week, though, cyclists must share the narrow, twisting roadway with cars – even though the valley is designated as a regional cycling route.

WABA cited these additional specific problems: Cycling through the Zoo tunnel is hazardous. The narrow trail along the Parkway just south of the Zoo tunnel is unsafe. See the map, Trail Problems, Rock Creek Park, page 15.

National Capital Parks--Central (NACC)

In National Capital Parks--Central, all sidewalks near the Mall and Ellipse are open to bicycle use, although some are quite narrow under bridges or along bridge deck sidewalks. Signs designate some of the routes, but they do not coordinate precisely with District of Columbia designations and they are easily vandalized. Currently, park staff are enlarging many curb cuts, installing missing sidewalk links and replacing hazardous grates.

The WABA study cited these additional problems on the Mall: curb cuts are lacking, and, at the Inlet Bridge by the Tidal Basin, stairs on the trail are an obstacle. See Trail Problems Around the Mall, NCP-C, page 17.

National Capital Parks--East

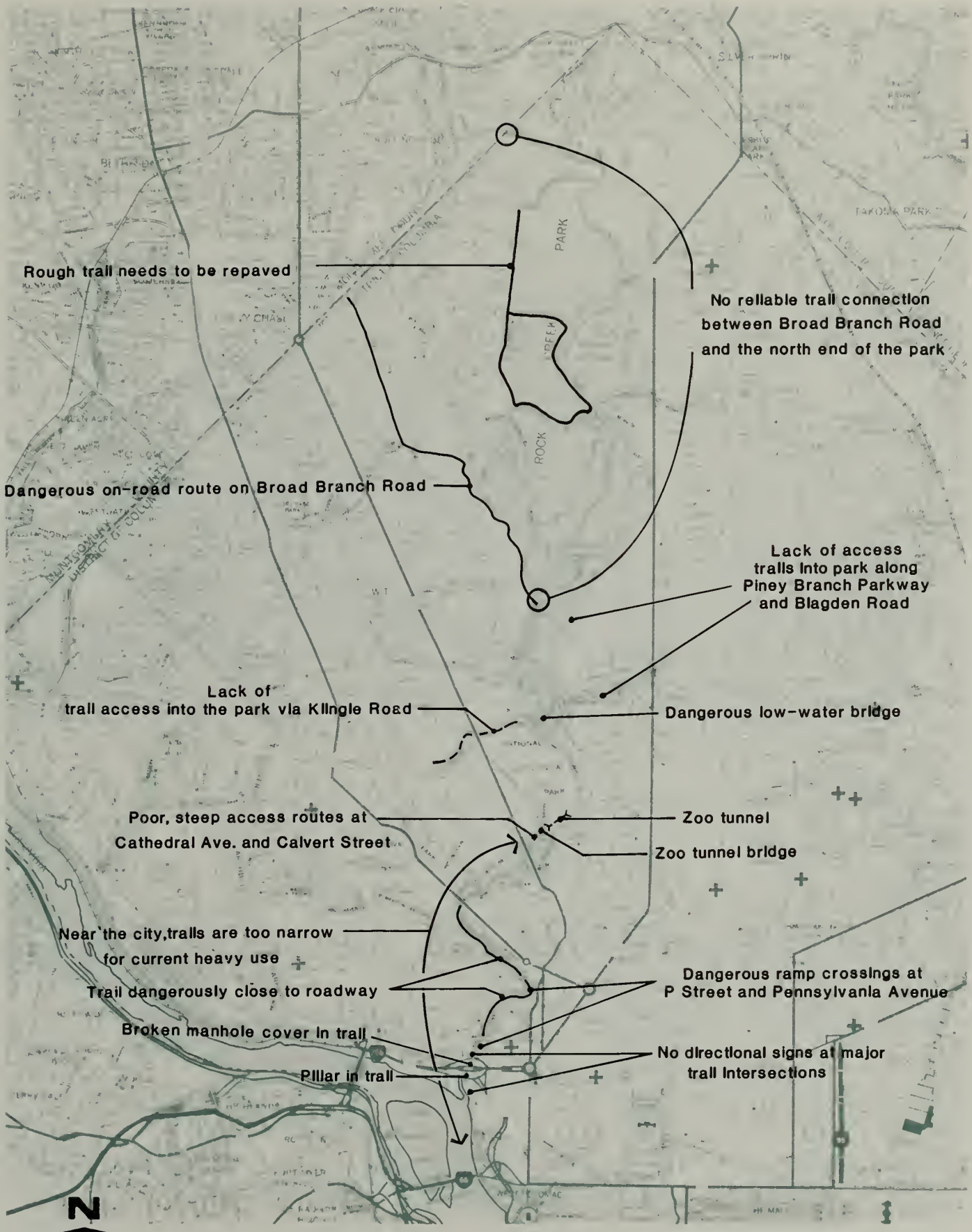
During the 1970s, in conjunction with the nation's Bicentennial, parts of the Fort Circle Park system in National Capital Parks--East were cleared and graded for multi-use trails. This implemented a series of trail plans which had been drawn up in the 1950s, 1960s, and early 1970s. Unfortunately, the funds earmarked for the Fort Circle trails were used to cover Bicentennial cost over-runs elsewhere, so the trails in NACE remain mostly gravel – too rough for general bicycle use, although ideal for mountain bikes. See Trail Problems, National Capital Parks--East, page 18.

Other segments of trail are found in Anacostia, Kenilworth, Fort Washington, and Piscataway parks.

The Oxon Cove trail originated in the 1970s, when commuting cyclists used access roads and a causeway built by the contractor who was then using part of the park for landfill operations. When those operations ceased, the cyclists petitioned for a recreational trail, which was built in 1978. The trail connects communities near Indian Head Highway to D.C. Village and government installations along the river. The Park Service has studied ways to link Oxon Cove, Fort Foote, and the Woodrow Wilson Bridge to the city, making these trails part of a proposed "Potomac Heritage National Scenic Trail." (See discussion of this proposed trail under Regional Trails.)

Low underpass clearance is dangerous and unnerving to cyclists. Here the Rock Creek Trail passes under Klingle Road (see Project R-11).

The Rock Creek trail just south of the National Zoo tunnel is too narrow and close to the roadway, providing trail users little protection from road traffic.



TRAIL PROBLEMS
ROCK CREEK PARK

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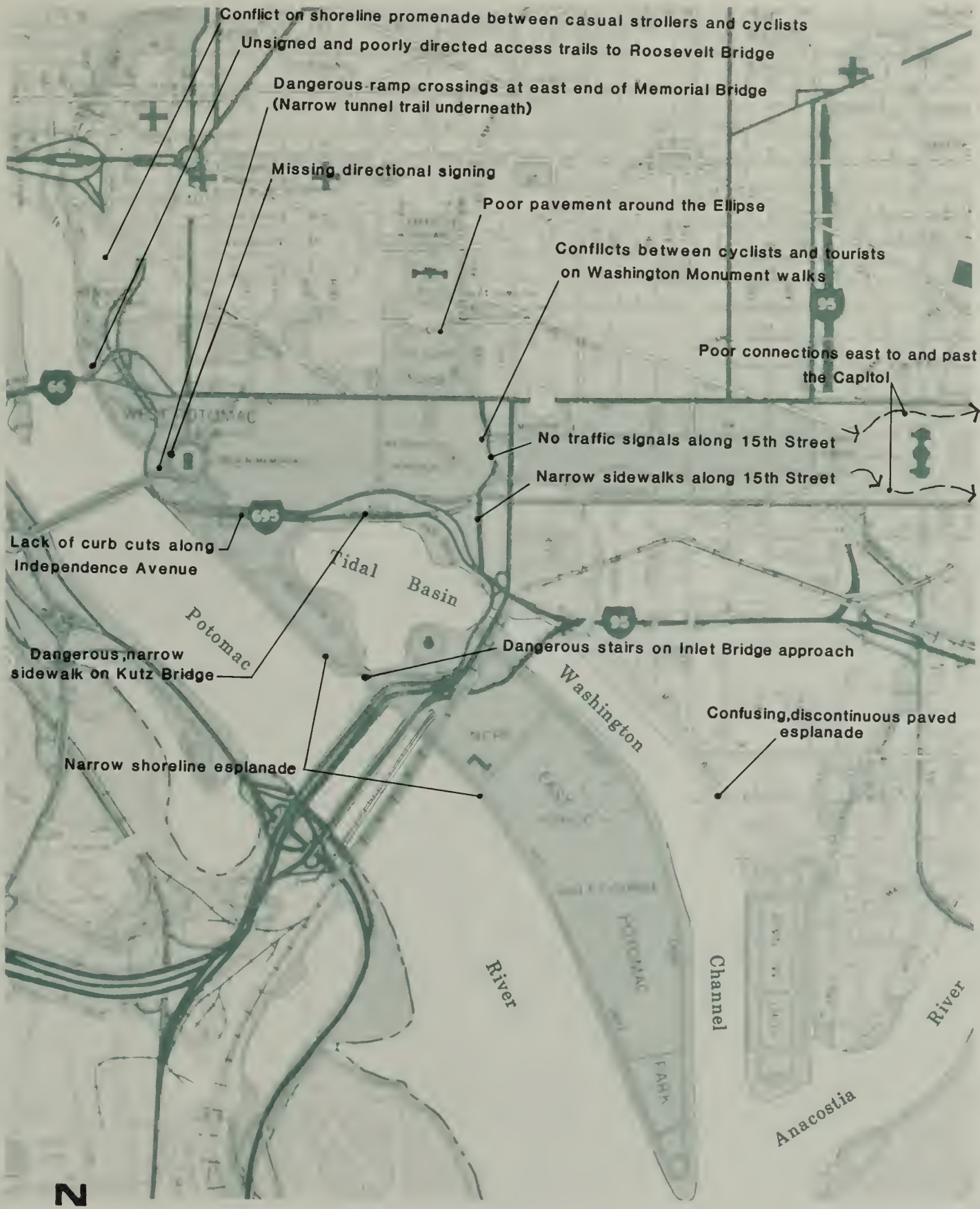
Use levels have outgrown trail capacity and design. Notice where footpaths and worn shoulders have developed.



TRAIL PROBLEMS AROUND THE MALL/NCP-C

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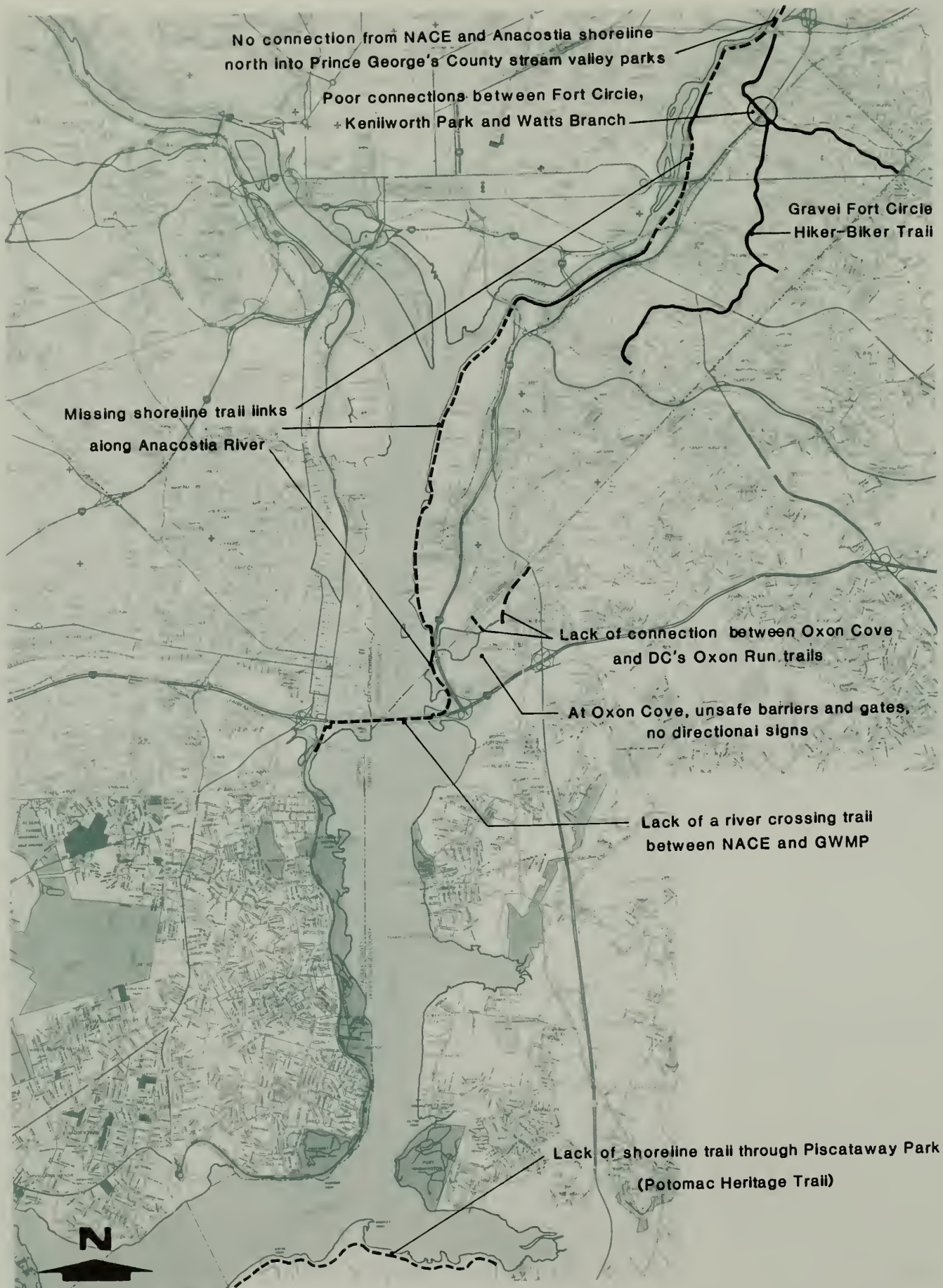

TRAIL PROBLEMS
NATIONAL CAPITAL PARKS-EAST

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The Fort Circle hiker-biker trail is rated "poor." Major problems include erosion, steep topography, poor layout, and lack of directional signs. No accident records are available for this trail system.

Problems on the Oxon Cove trail, according to the WABA survey, include rough, unfinished segments of trail and unsafe barriers and gates.

CURRENT CONDITION OF LOCAL TRAILS

Today, Park Service trails are only a small percentage of the dozens of miles of recreational trails in and around the city constructed by local governments – many of them built to more recent and exacting standards than the first trail projects. In response to the energy crisis in 1973, almost every county and city in the Washington metropolitan area began seeking alternatives to automobile transportation, and a surge of adult interest in cycling added to a growing demand for safe bicycle facilities. Most of the jurisdictions have developed plans for bicycle trails, striving to connect them to existing NPS trails, existing and planned METRO stations, and community facilities.

Each jurisdiction operates its system somewhat differently. The District of Columbia, for example, has designated almost all of its routes for bicycles on city streets. Prince George's and Montgomery counties are establishing off-road multi-use trails primarily in stream valley parks. Montgomery County has an ordinance requiring new highway projects and housing developers to include off- and on-road facilities as shown in the county's trail master plan.

Alexandria

The city of Alexandria published a bikeways plan about 1980. The success of the Mount Vernon Trail encouraged the city to tie into it and make a 12-mile loop up Cameron and Holmes Runs, across the west end of the city and back east on Braddock Road. Most of the anticipated off-street trails are completed, but many on-street routes are incomplete. At first, pressure to complete the city's system came from commuting cyclists; now more pressure comes from recreational riders. The city's Department of Parks and Recreation plans and manages the trails. See Trail System of Alexandria, Virginia, page 21.

Arlington County

In Arlington County, a paved trail connecting parks along Four Mile Run was built in the early 1970s, and commuters had a trail built from near Colonial Village to Rosslyn. In 1975 the county published a trail plan calling for a total system of 80 miles of on- and off-road trails. Most of the planned trails are now in place, some forming a 17-mile loop of the Custis Trail (along I-66, from Rosslyn west to Bon Air Park), the Four-Mile Run Trail, and the NPS trails along the Potomac shoreline. The current 76-mile county system includes 34 miles of off-road trail, and 42 miles on county streets. Some critical connections to Key, Memorial, and the 14th Street bridges lie in Park Service jurisdiction. In early 1988, the county completed a $1.3 million pedestrian and bicycle bridge that crosses the George Washington Memorial Parkway to connect Rosslyn with the Potomac shoreline and Mount Vernon Trail.

The county has a full-time bicycle coordinator and a full-time trails maintenance crew. Annual expenditures for bike-related capital improvements range from $100,000 to $300,000. See Trail System of Arlington County, Virginia, page 22.

District of Columbia

On-street bicycle routes were started in the District of Columbia about 1974. An official plan was adopted in 1976, and a full-time coordinator was hired to help develop commuter routes. In the early 1980s, federal funds became available for "transportation routes," and these funds have paid for most projects since then. A revised plan was quickly developed in 1983 with almost no citizen involvement. In 1987, another city-wide plan was developed, based on sustained citizen input and meetings of neighborhood advisory groups.

The current plan shows an extensive network of mostly on-street routes reaching every sector of the city, sometimes providing neighborhood alternatives to nearby park trails. The major routes include Massachusetts, New Jersey, and Nebraska Avenues, South Capitol Street, East Capitol Street and the Mall, MacArthur Boulevard, Suitland Parkway, 11th, and 14th Streets. One popular cycling area is the Department of Agriculture's National Arboretum, where low-volume roads allow cyclists and strollers to enjoy the profusion of flowering trees and shrubs.

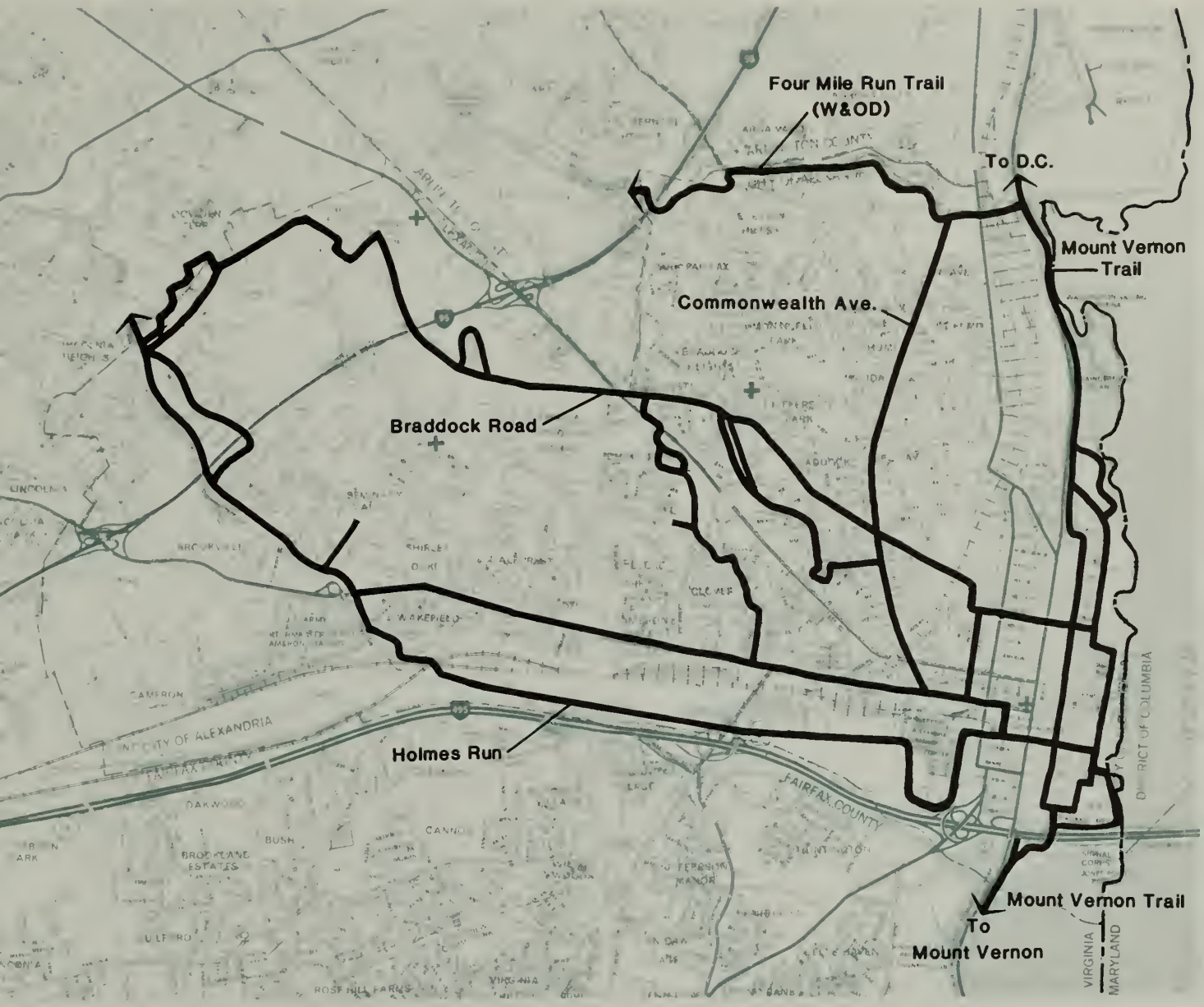
The city's bicycling system now consists of 44 miles of on-street routes, with less than a dozen miles of off-road trail, mostly along Oxon Run. Although about $500,000 has been spent in the past 10 years to build trails (90% from federal funds), the city is not in a position to maintain its trails. See Trail System of the District of Columbia, page 24.

Fairfax County

Fairfax County's population has increased sixfold since 1960, making it now the most populous jurisdiction in the metropolitan area. The county's approach to trails focuses on developers, who are required by ordinance to build segments of trails shown on a county-wide citizen-generated trails plan, which was approved in 1976. The plan calls for trails that are for recreation as well as utilitarian transportation. Many of the earlier trails built by developers are narrow and steep, better suited for pedestrians than for cyclists; more recent trails meet multi-use standards. Several county departments, including those of Comprehensive Planning, Environmental Management, Public Works, and the Parks Authority, oversee the construction of trails.

Many trails also run along roads and highways. They have been built with the cooperation of the Virginia Department of Transportation, which is responsible for road rights-of-way in the county. Park trails built in stream valley parks are operated by the Fairfax County Park Authority or the Northern Virginia Regional Park Authority.

The county spends about $500,000 a year on new and replacement trails. The system is still fragmented – only about 275 miles (25%) of a projected 1,100 miles have been built so far. Trails include sidewalk trails, stone-dust equestrian trails, and paved multi-use trails eight feet wide. The principal interface with NPS trails is along the George Washington Memorial Parkway south of Alexandria. Fairfax County also has begun to acquire scenic easements for the Potomac Heritage National Scenic Trail. See the map, Trail System of Fairfax County, Virginia, page 25.



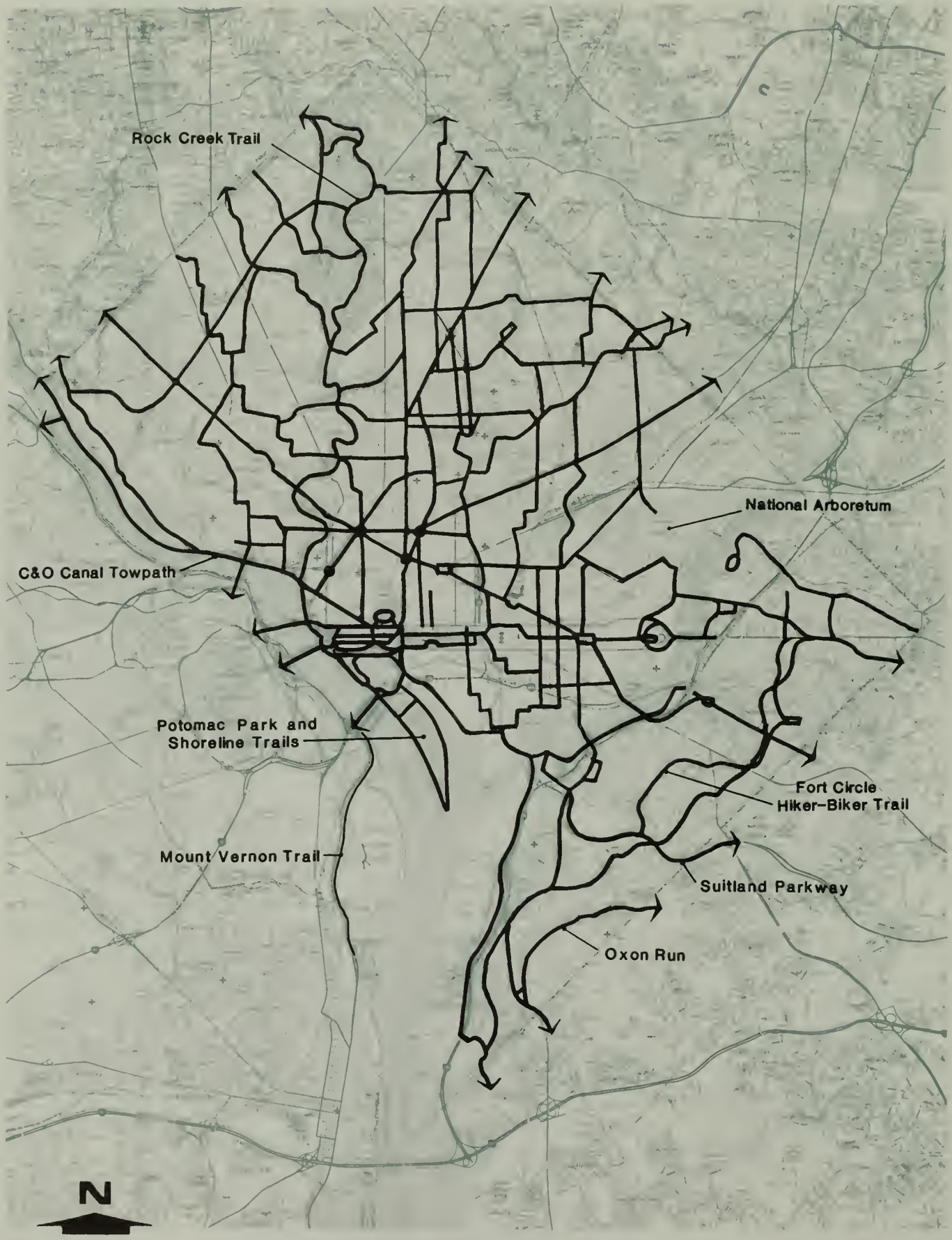
TRAIL SYSTEM OF ALEXANDRIA, VA.

800 | 40,078
DSC | MAR '90

TRAIL SYSTEM OF ARLINGTON COUNTY, VA.

800 | 40,079
DSC | MAR '90

A critical new link to the trail system in Virginia is Arlington County's new pedestrian/bicycle bridge. This connects the north end of the Mount Vernon Trail with the Arlington and Fairfax County trail systems.



TRAIL SYSTEM OF THE DISTRICT OF COLUMBIA

800 | 40,080
DSC | MAR '90

TRAIL SYSTEM OF FAIRFAX COUNTY, VA.

800	40,081
DSC	MAR '90

Montgomery County

Citizen interest in Montgomery County led to the development of a county-wide trails plan in 1975, showing facilities for both transportation and recreation. Funding has since withered for all but park trails and bikeways that are required by ordinance as part of highway and road improvement projects. As in Fairfax County, developers are required to build portions of trail that cross sites they are developing. Currently park trails in the county cover 29 miles, with recent annual capital expenditures reaching as much as $350,000. Twenty-six of these miles have been built in stream valleys as part of a projected 100-mile park trail system.

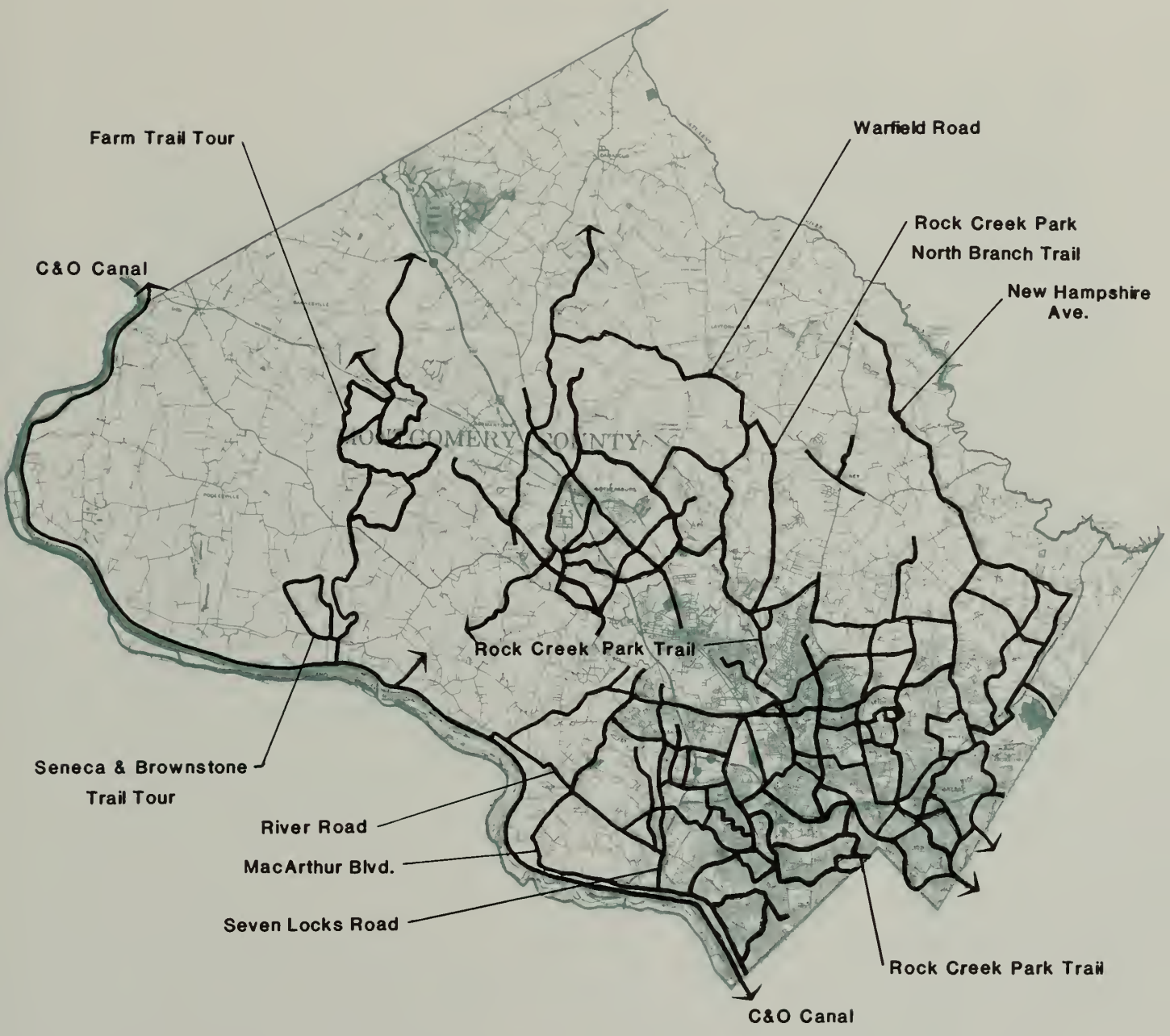
It is Maryland's policy that bicycle facilities will be built into all highway projects "where feasible and practical." Fifty miles of new bikeways have been built on county highways in the last 15 years, at a cost of about $95,000 a year. Currently a consultant is identifying trail access to METRO stations and employment centers.

Points of interface in Montgomery County with NPS trails include Rock Creek Park at the District of Columbia line, Cabin John Parkway, and various access points along the C & O Canal. The former CSX Georgetown Branch railroad line, which arcs from Silver Spring to Georgetown, is being considered for a trail and transit corridor (the "Capital Crescent Trail") that would connect to the C & O Canal. See the map Trail System of Montgomery County, Maryland, page 27.

Prince George's County

The trails master plan that Prince George's County developed in 1975 was updated in 1985 to accommodate equestrian trails. The principal corridors are stream valleys, augmented by some abandoned railroads, utility lines, and METRO connections. Exact alignments and implementation are determined by local community master plans; a full-time trails coordinator manages county-wide coordination and implementation.

Currently the county has about 50 miles of off-road trail (most are unpaved) and 65 miles of on-road routes. Capital investment in trails averages about $300,000 a year. Popular cycling areas include the University of Maryland campus in College Park and rural roads in the nearby National Agricultural Research Center in Beltsville. Besides potential trail connections at the Anacostia River and Oxon Run, the areas of major cooperation between Prince George's County and the NPS are Greenbelt Park and the Potomac Heritage National Scenic Trail. See the map, Trail System of Prince George's County, MD. page 28.

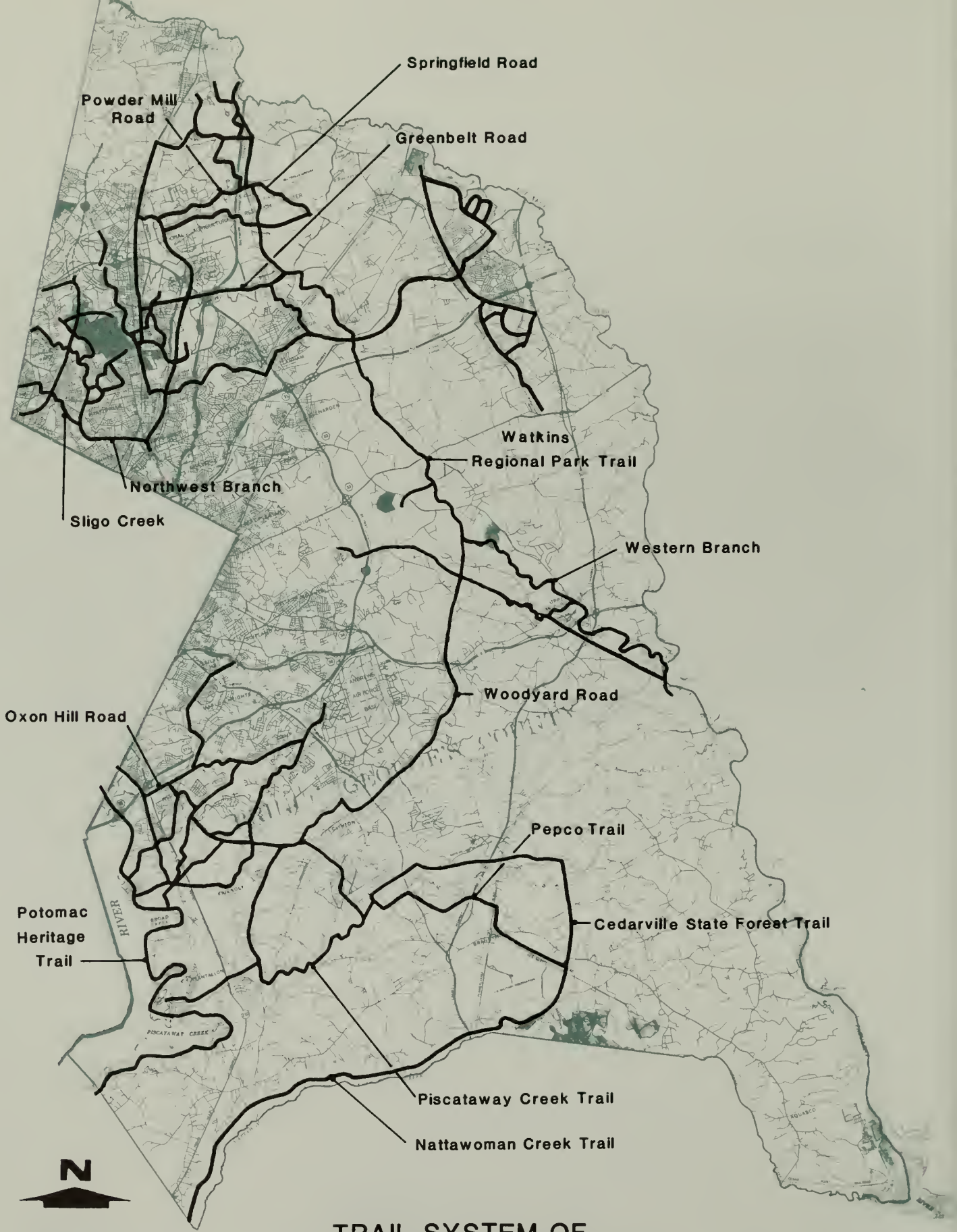


N

SCALE:
0 1 3 5 Miles

TRAIL SYSTEM OF MONTGOMERY COUNTY, MD.

800 | 40,082
DSC | MAR '90



TRAIL SYSTEM OF PRINCE GEORGE'S COUNTY, MD.

800 | 40,083
DSC | MAR '90

Courtesy Northern Virginia Regional Park Authority

Centerline striping along NVRPA's Washington & Old Dominion Trail helps reduce conflicts, especially where large volumes of cyclists share the trail.

CURRENT CONDITIONS OF REGIONAL TRAILS

The following trails extend over larger territory and are under the jurisdiction of various regional institutions.

Washington and Old Dominion Trail

Northern Virginia boasts the most popular rails-to-trails conversion in the nation. The Northern Virginia Regional Park Authority's Washington and Old Dominion (W&OD) Trail follows a former railroad right-of-way almost 50 miles from the Potomac shoreline in Arlington County to the Blue Ridge Mountains. The first section opened in 1975 in the city of Falls Church. In 1977, the regional park authority optioned 44 miles (480 acres) of rail right-of-way. Since then, all the land has been bought for $3.5 million and an additional $7 million has been spent on paving, bridges, and landscaping.

In 1987 the W&OD Trail was dedicated as a National Recreational Trail. Today, this trail earns enough income through land rents and utility easements to more than defray operating costs. It now connects Bluemont, Virginia, with the Mount Vernon Trail, via Arlington County's Four Mile Run Trail.

Recently, the W&OD Trail has been considered as an alternative Potomac Heritage Trail route north to the Leesburg area, paralleling the C & O Canal. A connection to the Canal can be made at White's Ferry near Leesburg, forming an 80-mile trail loop on both sides of the Potomac River.

METRO Connectors

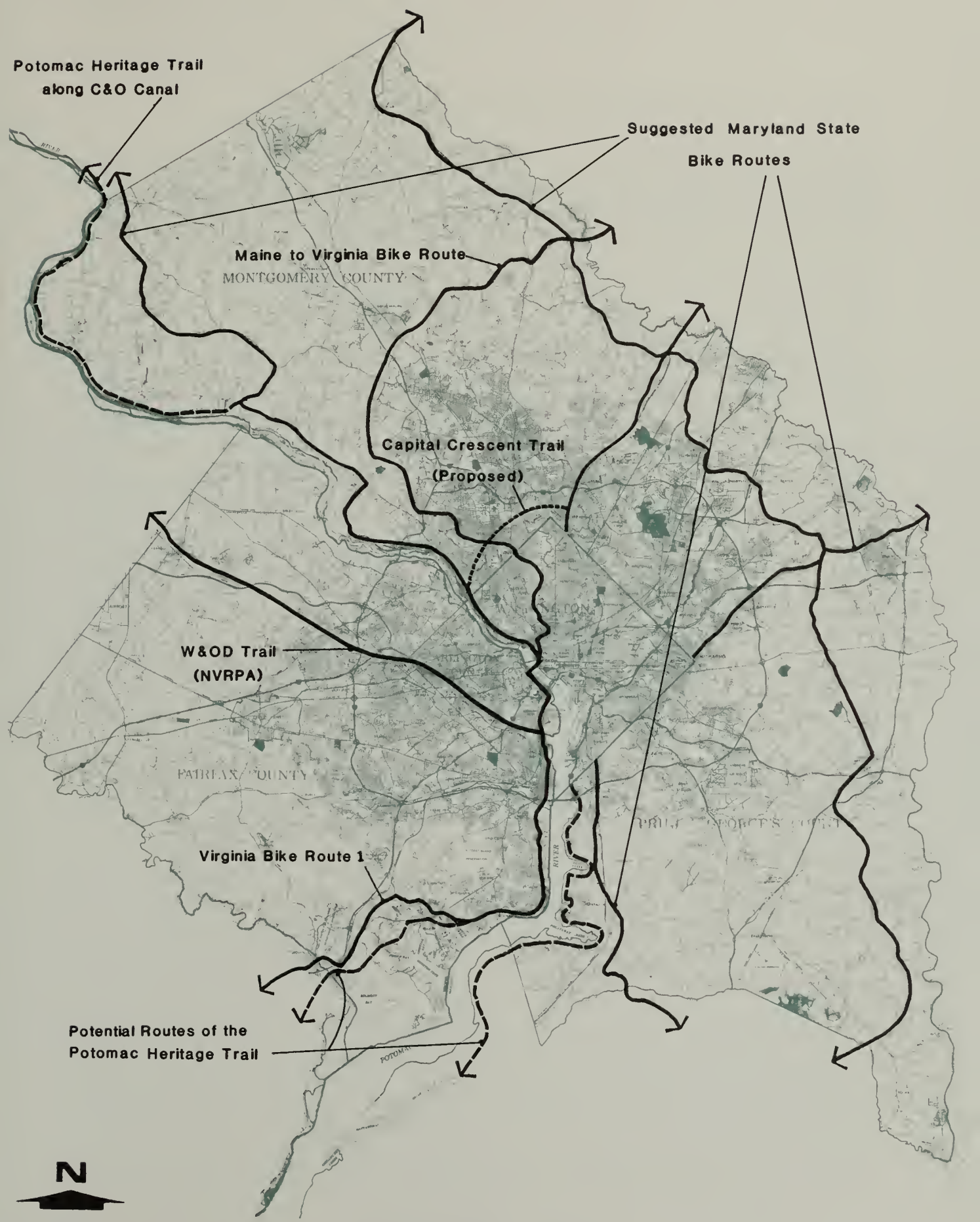
Since 1976, when a consultant analyzed the bicycle facilities needed for optimum access to the burgeoning METRO rapid transit system, trail connections have been built to some METRO stations. Many stations have bicycle storage lockers and racks. Bicycles are allowed on the trains evenings and weekends. At some suburban stations, hundreds of bicycles can be found parked every day.

Maine-to-Virginia Bike Route

This route, first known as the "East Coast Bike Route," was first mapped in 1976. In general, it capitalizes on quiet, rural roads and avoids congested areas; Washington is the only city it enters. It comes into the District near Chevy Chase Circle and joins Rock Creek Park via Broad Branch Road. It then follows the park south to the Potomac, crosses Memorial Bridge, and runs the length of the Mount Vernon Trail. Though it exists today only as a mapped route, more than 1200 maps showing this route were sold in 1987, and estimated users number in the hundreds per year.

Interstate Bike Route 1

South of Mount Vernon, the Maine-to-Virginia Bike Route continues on to Richmond, Virginia, using an on-road route installed (and signed) by the Commonwealth of Virginia. Popularly called "Interstate Bike Route 1," the route was first laid out and mapped by citizen cycling groups in the late 1970s, then adopted into Virginia's transportation system.



REGIONAL TRAILS
OF METROPOLITAN WASHINGTON, D.C.

800 | 40,071
DSC | MAR '90

Potomac Heritage National Scenic Trail

The metropolitan area's only congressionally designated long-distance trail is the Potomac Heritage National Scenic Trail. Conceived 25 years ago, the idea of a trail from the mouth to the source of the Potomac River has been seriously considered, but barely implemented. The trail actually exists only in fragments such as the C & O Canal towpath, the Mount Vernon Trail, and the Laurel Highlands Trail of Pennsylvania.

Although the idea for such a trail arose in 1965, when President Johnson called for a national system of trails to promote public enjoyment of outdoor recreation, planning has gone slowly. After years of proposals and feasibility studies, an 850-mile Potomac Heritage National Scenic Trail was officially authorized by Congress in 1983 – with stipulations that none of the trail be established in West Virginia and that only land within national park boundaries could be purchased by or donated to the federal government.

In recent years, planning for the trail has progressed slowly, with help from the Potomac Heritage Trail Association. The Park Service has signed a trail development/management agreement with the Appalachian Trail Conference, and several parts of the trail are being developed from the north end of the C & O Canal to connect in Pennsylvania to the Laurel Highlands and Pittsburgh.

Vital for public access to the Potomac Heritage Trail is a trail connector at the Woodrow Wilson Bridge, which carries I-95 across the Potomac at Alexandria. The National Park Service has advocated the addition of a pedestrian trail deck, but estimated high costs, jurisdictional conflicts, complicated engineering, and lack of connecting trails in Prince George's County have all hampered the completion of this project.

This survey of trail system components demonstrates that planning policies and funding mechanisms vary throughout the region, making some comparisons difficult. Although still incomplete as a system (see appendix B, A Brief History of Washington's Trails), these various components are becoming more integrated. In the past few years, the Bicycle Technical Advisory Subcommittee of the Washington Metropolitan Council of Governments (COG) Transportation Planning Board has facilitated this coordination among jurisdictions through monthly meetings. As a result of this interest, the metropolitan area's trails are evolving from fragmented segments into comprehensive, interlocking systems.

III. OTHER CURRENT CONDITIONS

Conditions other than physical status affect development and use of trails. Following is a discussion of the rising use of recreational trails and the resulting implications for safety. Also surveyed are current trail policies, legal issues, and funding patterns. Statistical data is provided to assist in this review of conditions. Although this information is sketchy, some significant trends can be identified.

USE

Between 1972 and 1974, when bicycling suddenly became fashionable for fitness and energy-savings among young adults, 43 million bicycles were sold in the United States. The result was an enormous demand for bicycle trails and facilities that, in the Washington, D.C., area, produced the sudden appearance of paved recreational trail systems.

The bicycle boom that began in the mid-1970s clearly continues. According to the *1988 Bicycling Reference Book,* 85 million people in the United States – about half the total population – now own or ride bicycles. This figure represents an increase of 13 million riders in five years; in 1987 alone, about 12.6 million bicycles were sold.

On average nationwide, 32% of the population own a bicycle (A.C. Nielsen National Survey, c. 1980). This translates into some 800,000 bicycle owners in metropolitan Washington, D.C. Most cycle just for fun and exercise, although a significant number commute regularly to work on bikes (5,300 in the 1980 census for the Washington area). In addition, bikes are used for competition races and touring vacations by thousands each year (Feldman and DeHaven). Because Washington, as the nation's capital, enjoys an influx of millions of visitors each year, bicycles are also rented by the thousands.

The recent District of Columbia Department of Recreation *Comprehensive Recreation Plan* (1986) compares local use of trails by percentage of the total population to nationwide use.

Activity	DC Area	Nationwide
Bicycling	60%	35%
Running and jogging	45%	30%
Hiking	25%	15%
Walking for pleasure	20%	55%

Clearly Washingtonians prefer cycling and jogging to slower modes, such as walking or hiking; they exceed the national average in the first three categories. Bicycling and jogging "have risen from limited popularity to the status of major pursuits over the past two decades" (District of Columbia Department of Recreation, 1986, p. 31). These statistics suggest that trail designs should particularly address speed conditions to improve safety.

Unfortunately, no procedure exists for systematically measuring the use of recreational trails. The following statistics, sketchy as they are, form the best data in recent years.

Mount Vernon Trail

A citizens' counting project conducted along the Mount Vernon Trail in August, 1983, indicates that the mix of bikes to pedestrians remains almost constant on weekends and weekdays, but that weekend use is significantly higher (Jeanette FitzWilliams, Virginia Trails Association). The following results were obtained at milepost 7 south of Alexandria.

Category	Sunday	Monday
Morning inbound	256	180
Morning outbound	197	160
Afternoon inbound	300	251
Afternoon outbound	295	197
Total per day	1,048	788
Average per hour	91	69
Number cyclists (% total)	578 (55%)	439 (56%)
Number runners/joggers (%)	365 (35%)	277 (35%)
Number walkers (% total)	105 (10%)	72 (9%)

A 1985 observational analysis (Barnett, 1985) between the Memorial and 14th Street Bridges on weekdays found these differences in use at the two bridges.

	Mount Vernon Trail at	
	Memorial Bridge	14th St. Bridge
Users per day	820	400
Percentage cyclists	50%	78%
Percentage runner and joggers	45%	20%
Percentage commuters	60-65%	75-80%
Percentage adult males	80%	80%
Percentage wore helmets	50%	50%
Those coming from Arl. Cemetery	63%	n/a
Those crossing Memorial Bridge	85%	n/a
Those heading north	n/a	75%
Those crossing the 14th St. Bridge	n/a	50%

These observations indicate a definite diversity in the types of users and they suggest that this mix varies at different points in the system.

In the summer of 1986, staff analyzing use of the entire Mount Vernon Trail counted 120 to 320 bicyclists per hour, with higher counts near Alexandria and Washington (Feldman and DeHaven). The highest single-hour count was 716 bikes near Daingerfield Island; the highest hourly count by the trail patrol is about 1000 users. Cyclists use the trail year round, with heaviest use in nice weather. The times of greatest use each day are 8 to 11 am and 2 to 5 pm.

Currently, automatic bicycle-sensitive counter loops provide daily counts at Belle Haven and Daingerfield Island. The monthly totals for bicycles at those locations for 1988 and 1989 are as follows (NPS Statistics Office, Denver):

Month	Belle Haven 1988	1989	Daingerfield 1988	1989
January	779	2,526	927	3,344
February	2,347	4,159	2,791	5,541
March	6,327	10,128	7,703	12,905
April	9,718	6,624	13,435	11,095
May	26,613	13,074	16,386	16,434
June	15,491	14,929	17,723	16,180
July	15,383	43,674	7,262	18,941
August	13,652	13,652	14,859	15,355
September	2,156	10,501	14,043	14,428
October	n/a	9,404	n/a	19,129
November	n/a	n/a	n/a	n/a
December	n/a	n/a	n/a	n/a

User volumes vary seasonally, as these figures indicate, while peak use of the Mount Vernon Trail comes in the warm months, and use is greater closer to the city. Trail use is clearly growing Nine-month totals from 1988 to 1989 increased at Belle Haven by 29% (from 92,466 to 119,267) and at Daingerfield by 9% (from 105,129 to 114,223).

C & O Canal Towpath

No detailed counts are available. But more than 300,000 cyclists are estimated to use the lower towpath each year (averaging over 800 per day), and three bike rental concessions are associated with the trail.

Rock Creek Park

A 1987 student survey in Rock Creek Park (Bosworth, 1987) observed that most trail users are cyclists (up to 70% on weekends), that commuters are a significant minority, and that weekend and weekday peak times are quite different. The southern end of the park – along the Rock Creek and Potomac Parkway – receives the most use, and weekend use is at least double weekday use (1,700 per day on weekends, 860 per weekday near the Kennedy Center). The survey also revealed that about 25% of the cyclists wear helmets.

Although sketchy, these statistics suggest that trail use is increasing every year and that pedestrian and bicycle use is about evenly divided, except at rush hour. Until consistent, uniform, systematic, verifiable statistics are available, however, little can be accurately ascertained about the public use of NPS trails in and around Washington, D.C. These numbers do imply, however, that the demand for trails that provide safe and scenic recreation continues to increase and it is easy to anticipate a growing number of potential conflicts between different types of users.

SAFETY

Statistics from the National Highway Traffic Safety Administration show that the number of fatal bicycle accidents nationwide has stayed around 900 per year, while the percentage of adult victims has grown in that same period from 22% to 38%, reflecting both the general aging of the population and the increasing popularity of cycling among older riders. Automobile-bicycle accidents are the most lethal – 90% of the fatal bike accidents involve motor vehicles. About 30% of the fatalities were boys between 9 and 12 years old (Cycling News Service, 1988, pp. 11-12).

Even though Washington's trail system is one of the largest and most diversified in the nation, congestion and conflicts are increasing here as elsewhere. Problems with user speed, etiquette, and dogs on the trail seem universal, and they are intensified on narrow, sub-standard trails.

Statistics on safety, like those on use, are sketchy. Curiously enough, most accidents seem to occur at times of light to medium use; at times of peak use, incidents are few. We know, further, that accidents on the Mount Vernon Trail increased from 20 in 1984 to 59 in 1986 and that they clustered at intersections and on steep or curving slopes. This suggests that crossing conflicts at intersections and excessive speeds on slopes may be factors. On Rock Creek Park trails, serious accidents reported to the U.S. Park Police have been ranging from 8 to 13 a year.

FEDERAL POLICIES ABOUT TRAILS

A number of policies related to trails and bicycling are articulated in the *Code of Federal Regulations* (CFR) covering all federal facilities. In the CFR, bicycles are considered vehicles and are prohibited everywhere in national parks except where designated. Bicycle routes are determined after assessment for environmental impact – and route locations are officially announced for public review. The CFR says nothing specifically about "all-users" or multi-purpose trails (Loach, phone interview).

Within the National Park Service, *NPS Management Policies* addresses resource protection and visitor use. The following relevant statements come from the 1988 revised draft.

> All trails will be carefully located, designed, and managed to avoid conflicts among different users, prevent erosion, and protect fragile ecosystems from unregulated use (p. 4-10).
>
> Where the level of use suggests that conflicting uses may endanger visitors or reduce visitor enjoyment, hiking, equestrian, ski, and bicycle trails will be separate (p. 4-10).
>
> Bicycle lanes on park roads may be provided where safe, feasible, and appropriate. Bicycle trails may be provided where appropriate and where site conditions are suitable. Bicycle trails may be paved or stabilized for the safety and convenience of travelers. Bicycles will normally be prohibited from hiking trails because their use would adversely affect hikers' safety and the hiking experience and cause trail damage (p. 4-11).

The National Park Service will cooperate with other land managers and with user groups to facilitate trail access to parks (p. 4-11).

Interpretation will instill public understanding and appreciation of park values and resources, fostering public support for preserving them. It will encourage and facilitate appropriate, safe, minimum-impact use of parks (p. 8-2).

Every reasonable effort will be made to make the facilities, programs, and services of the National Park Service accessible to and usable by all people, including those who are disabled (p. 8-9).

The National Park Service will strive to identify recognizable threats to the safety and health of persons and to the protection of property, by applying national accepted codes, standards, engineering principles, and the requirements of the "Loss Control Management Program Guideline" (NPS-50) (p. 8-9).

LEGAL ISSUES

Under the law, bikeways are generally considered "highways" that should be designed to achieve safety through commonly accepted practices and standards. The designation of a bicycle route does not therefore establish liability, since liability already exists under highway law.

If people are injured on a public trail, they must prove negligence on the part of the public owner. In general, the public owner is immune from suits unless its duty to protect the public from unreasonable risk has been breached, and its negligence provides a direct cause for the injury. In many states (such as Maryland and Virginia), recreational facilities where no entrance fee is charged are generally immune from tort liability. Design problems are usually immune unless standards have been clearly violated. An administrative decision to delay repair provides immunity. Although repeated poor maintenance removes immunity, as does failure to post warning or hazard signs, the simplest and most practical correction of the hazard will often re-establish immunity.

In the National Capital Regional Office of the Park Service, few tort claims for trail accidents have been filed or won in recent years. Due to Virginia and Maryland's immunity laws, the successful claims have generally been filed in the District of Columbia, but they have cost only $25,000 in recent years. Most have been caused by poor maintenance, uneven trail edges, and overhanging branches. One accident in Fairfax County, on a sub-standard trail built by a developer, however, resulted in a $2 million settlement against the developer. As trail use continues to grow, the major problem is likely to be conflict between high-speed cyclists and slower-moving pedestrians. Speed limits, gentle ripple boards, center and edge striping, periodic informational signs, regular hazard inspections, and a uniform width of nine to ten feet to accommodate maintenance vehicles could all help reduce future tort problems (Lindsey, phone interview and letter).

FUNDING AND MAINTENANCE OF NPS TRAILS

Annual funding and maintenance for trails varies greatly from park to park. Estimates of the annual costs of maintaining paved trails range from $2,600 per mile for GWMP to

$650 per mile in Rock Creek Park (NPS, 1987). The Mount Vernon Trail has probably enjoyed the most attention per mile, and it is the only NPS trail in the city to have a special bicycle-mounted trail patrol. Usually only one or two rangers are on duty at once. (A volunteer program is being initiated to expand first aid and bicycle repair programs.)

The capital used to build the Park Service trails has in most cases come from special contingency funds or from each park's operating funds. Repairs have all come from park operating funds or regional cyclic maintenance funds. In either case, maintenance competes with many other projects. The NPS Washington office funds technical assistance to parks and regional offices with rivers and trails, but this money has seldom been used in the National Capital Regional Office.

Some U.S. Department of Transportation funds for road widening are available for bicycle trails and the enhancement of non-recreational bicycle routes. In the Washington area, this could include all river bridge approaches, community connectors, and cooperative projects where commuter use has been documented. These funds are usually obtained competitively through state highway programs from the Federal Aid funds under the 1982 Highway Improvement Act.

Overflow traffic from congested trails creates new trails, resulting in a natural separation of users and a lessening of conflicts. Rock Creek and Potomac Parkway, near Calvert bridge.

IV. CHALLENGES

The section of the Mount Vernon Trail that runs along parts of National Airport is an ideal paved trail, concluded the Washington Area Bicyclist Association (WABA 1988). It is 10 feet wide, smooth, gently curved and graded, and well drained. Although parts of some trails in Washington, D.C., are in excellent condition, there are, however, a number of serious challenges to meet.

The WABA report cites and illustrates these overall problems with the metropolitan trail system, the design of trails, the availability of information, and matters of management and maintenance. To the problems that these trail users have identified, the staff of the Park Service and of local jurisdictions have also added others. These problems, presented in the following lists, are grouped according to these two main sources.

SYSTEM DESIGN

User Concerns:

Unfinished connections (such as the Crystal City tunnel, and the Oxon Cove link to Forest Heights).

Areas of visitor conflict (such as the esplanade in front of the Kennedy Center).

Staff concerns:

Lack of uniform or national standards when the trails were first built.

Poor connections and coordination between different trails systems.

TRAIL DESIGN

User concerns:

Poor trail surfaces (especially in Rock Creek Park).

Narrow trails with ravelling, cracked edges.

Obstructions (such as bridge piers).

Steep, unsafe slopes, with no run-out at the bottom.

Unsafe bridges (such as the low-water bridge near Porter Street in Rock Creek Park).

Narrow bridge sidewalks (such as the Virginia Route 233 entrance to National Airport).

Dangerous cross-walks (such as around Memorial and Rosslyn Circles, at P Street and at National Airport exits).

Lack of protection from traffic when the trail lies next to a road (along the Rock Creek and Potomac Parkway).

Poor sight distances (some wooded sections of the Mount Vernon Trail).

Unsafe barriers intended to keep out motor vehicles.

Staff concerns:

Trail conflicts between different types of trail users: high-speed cyclists, pedestrians, joggers, unleashed dogs.

Problems of flooding, steep topography, and inaccessibility produced by the use of marginal land for parks.

Problems of curvature, side slope, overhead and side clearance, and width on trails constructed before national standards were adopted.

INFORMATION SYSTEM

User concerns:

Lack of directional and safety signs almost everywhere.

Staff concerns:

Insufficient directional information, especially given increasing interconnections of trails in different jurisdictions.

Lack of information about trails for potential users.

MANAGEMENT, MAINTENANCE

User concerns:

Poor security in remote, unpatrolled areas away from roads.

Chronic potholes, tree root bumps, and broken glass on the trails.

Staff concerns:

Diverse user groups, some of whom resent speed controls and other attempts at regulation.

Wide variation in trail maintenance from one park to another.

Wide variation in users' trail experiences from one park area to another.

Inconsistent procedures for inspection and maintenance of trails.

Lack of funds for new facilities as well as maintenance.

Increasing potential for tort claim liability, as facilities age.

Lack of uniform user statistics for trail planning and analysis.

The fact of the matter is that many of the trails were built before national or state design guidelines had been formulated. Most were ad hoc, built to meet immediate needs and with no pre-construction planning. Increasing use, deteriorating pavement and structures, and the introduction of higher-speed bicycles further strain the system. With increasing use, once-isolated scenic trails are now inter-jurisdictional connectors. Each park sets its own budget and staff priorities, and the resultant discrepancy in trail work has caused wide variation in trail quality. Under current budget constraints, few parks can afford regular, periodic inspections of park facilities. Even when problems are identified, getting them fixed is often deferred because of more pressing needs.

Current trail signs provide only minimal information. Clearer, more informative signs are needed on most trails.

Trees or tree roots that have grown into the sidewalk create hazards for cyclists. Maine Avenue at 15th Street, NW.

V. RECOMMENDED POLICIES AND PROGRAMS

The challenges described in the previous section are not insurmountable. Meeting them will, however, entail both new programs and new projects.

Recommendations for overall management policies follow, and also for programs that address each type of challenge described in the preceding section – system design, trail design, information systems, and management/maintenance. The view is system-wide; the purpose is to lay the groundwork for recommending some 75 specific projects in "Recommendations; Construction Projects."

POLICIES

The following refinements of the national NPS Management Policies are suggested to steer trail development and administration in the NPS National Capital Region.

> The Service is encouraged to more widely *disperse* use of its metropolitan-area trails by developing scenic trails in other locations.
>
> Design trail systems to accommodate the recreational needs of the *major* types of users, addressing such factors as trip length, speed, and support services. Heavily used trails near the city should be wider than less used trails farther out.
>
> Trail types should be *separated* to minimize conflicts between cyclists and pedestrians where adequate land is available and environmental impacts will not be adverse. Where uses must combine on one paved trail, accommodating measures should be taken, such as widening the trail to at least 10 feet.
>
> Install a *consistent sign system* on NPS recreational trails in metropolitan Washington, D.C. The system should offer route directions, warnings, and interpretive information. Signs should be coordinated with other jurisdictions at key intersections and access points.

SYSTEM DESIGN RECOMMENDATIONS

As bicycle facilities have proliferated, so have standards or guidelines for designing these facilities. Three sets of standards have been used for this study: The American Association of State Highway and Transportation Officials' 1981 *Guide for Development of New Bicycle Facilities* (AASHTO), the U.S. Department of Transportation's *Manual of Uniform Traffic Control Devices* (MUTCD), and a report prepared for the National Capital Region in 1979 by Barton-Aschman Associates called *National Park Service/National Capital Region Bikeway Planning and Design Manual.* Most jurisdictions now accept the AASHTO guidelines, although these guidelines are less strict than formal standards. The MUTCD section on signs for bike routes is considered legally binding in many areas.

The following standards should be followed where possible in the Washington area for visual consistency, user re-assurance, and ease of maintenance.

Trails should be *planned in their entirety,* not piecemeal, so that alignment questions, bridge crossings, destinations, signs, intersections, parking, and support facilities are addressed. Coherence is especially important where trails cross jurisdictional lines. Paved trails should conform to a *uniform width* of 8 to 10 feet. In areas of heavy use near the city, trails should be widened to 12 feet. Widening 25 miles of trail by an average of 3 feet would cost as much as $1.4 million.

Pavement should be smooth, even, unbroken, and clean. A minimum two-inch layer of asphalt is the best surface, the least visually intrusive pavement in a park environment. Asphalt should be special-mixed for trails, which must withstand different vibration and use rates than roads. Seal coats should be applied periodically to minimize cracking and spalling. Curves should be super-elevated for ease of travel. Smoothness and crown are best ensured by a graded subbase 4 to 6 inches thick. Pavement edges must be stable, and flush to the ground on both sides.

Drainage is critical for safe trail use. Run-off from asphalt must be handled by swales, catchbasins, or cross drainage. Dips, bumps, soft spots, and puddles must be eliminated so that trail users do not lose control. Gravel is not desirable, especially on slopes: when the edges drop away, gravel trails become hazardous.

Trail Bridges should be 2 or 3 feet wider than the adjoining trail to provide emergency maneuvering room when cyclists pass. For example, on a trail 10 feet wide, bridges should be 12 to 14 feet wide. Approaches at either end may need periodic re-pavement to account for abutment settling.

Tunnels and underpasses should be kept to a minimum since they are prone to poor drainage and poor visibility. They also can be the scenes of unobserved crimes.

Trail curvature should be gentle (100 to 500 feet in radius). Sudden sharp curves, especially at bridges, can cause cyclists to lose control, yet a dead-straight trail is boring and leads to speeding. The ideal is a trail that offers views that are continuously opening.

Trail grade should be less than 5%, except for short distances where adequate run-out is provided at the bottom.

Centerline and edge striping is recommended for all trails to help users stay on the correct side. At intersections and points of confusion, arrows indicating lane direction may be appropriate. Some parks are uneasy about "visual intrusion," but painted lines on trails are no more distasteful than stripes on a scenic parkway. Where an entire trail like the W&OD has been striped, there has been little adverse aesthetic impact, and most users have welcomed the striping. Also, the color of striping can be experiemented with if the park wants to tone down the visual impact.

Intersections should be highly visible, with appropriate striping and signs that can be seen by both cyclists and motorists, especially at night.

Traffic signals should be timed so cyclists and pedestrians can move comfortably through intersections.

Speed limits posted by signs are not legally enforceable, since cyclists are not required to have speedometers. The best way to control speed is to design the trail so that the optimum speed is the most comfortable speed.

TRAIL DESIGN CONSIDERATIONS

A well designed trail must meet complex criteria. Among the considerations that need to be taken into account are types of route, relationships to nearby roads, the types of people who use the trail, the types of cyclists in particular, and design details. Following is a discussion not only of suggested standards but also of principles that contribute to good trail design.

Types of Routes

FHWA's 1986 study defines four major types of routes in and around cities: rural touring routes, urban recreation routes, urban access routes, and an urban (usually on-street) network. The urban network tries to accommodate all types of trips and optimizes directness and safety. The access routes usually have specific purposes and destinations. The urban recreation routes are the most popular and attract the widest variety of users with the widest range of experience. These trails should optimize access, continuity, attractiveness, security, and easy grades and curvature (FHWA, 1986, pp. 302-312). Most of the trails under discussion here are of this type.

Relationships of Trails to Roads

Six relationships of trails to roads have been analyzed:

- Shared roadway, with cyclists in the travel lane.
- Shared roadway, with a curb lane at least 13 feet wide.
- Roadside shoulder, at least 3 feet wide.
- One-way bike lane, at least 4 feet wide.
- Sidewalk (4-5 feet wide, or 8-12 feet wide if shared with pedestrians).
- Off-road bike path or all-users trail.

Where trails share the roadway, the width of the outside motor vehicle lane is the most significant factor in reducing conflicts with cars. A lane 14 to 16 feet wide is recommended if high-speed cars are present; 12 feet is too narrow. The widened lane should be striped to prevent cars from doubling up in it. Because most bicycle accidents occur at intersections and driveways, on-road bicycle trails are best located in low-traffic residential areas rather than in high-traffic commercial areas (FHWA, 1986, pp. 26, 54-85, 108-110. FHWA is now finalizing a study making recommendations for how best to accommodate bicycles on highways.)

Marked on-street lanes for bicycles should be 5 feet wide; 4 feet is a minimum.

Off-road bicycle trails should be 5 feet wide for one-way traffic and 10 to 12 feet wide for two-way use. (Eight-foot width is acceptable for light use, but 10 feet is considered optimum.) Shoulders on either side should be graded, cleared, and at least 2 feet wide. To prevent spills, pavement edges should be stable. A design speed of 25 m.p.h. should be used, which means that the super-elevation of curves should not exceed 2%-5% and

a 150-foot radius is the desirable curvature (a 100-foot radius is a minimum). Sharper curves should be widened and warning signs posted. Grades are best kept to less than 5%; stopping-sight distances of 120 feet are a minimum.

Types of Users

Multi-use trails are more difficult to design than bicycle trails, since they must be sized to satisfy not only cyclists but also walkers, joggers, and hikers. Conflicts between users should be designed out as much as possible before a trail is constructed. Pedestrians tend to seek scenic, quiet loops of moderate distance (1-5 miles). Hikers enjoy 6 to 10 or more mile hikes for a day's outing. Cyclists prefer longer distances (10-30 miles) and are less sensitive to noise or intrusions.

Types of Cyclists

As the 1986 FHWA study observes, there is no typical, average "design" cyclist. Instead, cyclists in urban areas can be young or retired, slow or fast, experienced or unsure, relaxed or on the way to work. Some cyclists ride a trail only once, others are regulars. According to the FHWA (FHWA, 1986, pp. 20-24), most cyclists fall into one of six broad categories, each with somewhat different needs and requirements: the Kid, the Novice, the Commuter, the Shopper, the Tourist (especially on regional routes), and the Racer (who doesn't usually need or want trails anyway).

Standard Design Details

Barriers to keep out motor vehicles, bike racks at places people want to park and lock their bicycles, curb cuts at intersections across streets, and counter loops to record trail use are among the details of multi-use trails that deserve attention. Other details include trail bridges, culverts and end-sections, pavement cross-sections, sign mountings and clearances, bulletin boards, information kiosks and waysides, street grates, railings, barriers between motor vehicles and trail, water fountains, and benches. Trail details that have proved successful include vehicle detectors that count bicycles. Also "Ribbon Racks," are recommended by WABA and were recently placed at the entrance to Roosevelt Island. Upside-down U racks are found at Rosslyn Gateway Park. The District of Columbia Bicycle Office can suggest additional details that have proved satisfactory in Washington and elsewhere.

From the wide variety of choices available, the details chosen should be consistent for the length of any given trail. Better still would be consistent details throughout an entire system.

General Principles of Trail Design

Less fixed than standards but potentially useful to designing trails are the following principles.

Existing corridors of disturbance (such as utility lines and abandoned rail corridors) should be followed where appropriate.

Fragile or protected environments should be avoided, and adverse impacts on other environments should be minimized.

Trail alignment should be distinctly and consistently defined.

Routes should be aligned to facilitate personal security and police patrolling. The enjoyment of scenic features should be maximized.

Long-distance routes should be combined with smaller loops and connectors to provide a variety of trip options.

Although the use of trails by pedestrians and cyclists should be encouraged, use by motorized vehicles or horses should be discouraged.

Flush curbs, full-width curb cuts, widened parking spaces, and rest areas near trailheads should be used to make trails fully accessible to special populations.

Bicycle rental, map sales, and tourist promotion, and other visitor services should be encouraged.

Parking and access should be provided at key points.

Information Systems Considerations

Information systems are often forgotten in the course of construction projects. Yet the "software" of trails (information) is as important as the "hardware" (the trails themselves) and is usually more cost effective. Good signs, maps, and brochures can markedly improve the experience of trails users, enhancing their safety and their appreciation of natural and cultural resources.

Sign Planning Principles

Signs should welcome trail users, provide directions (giving destinations and mileages), warn of hazards, describe significant features, supply and interpret information. Signs should be regularly spaced. Caution and crossing signs at intersections should be visible to both the trail and the road at key intersections, "To (name of trail) trail" signs should show trail choices. Mileposts help trail users measure their accomplishments, and staff and police can use them to report locations of accidents and repair work. Bridges should be labelled to re-assure travellers that they are making the correct crossing. All hazard, safety, and regulatory signs should be reflective for visibility at night.

The shape, style, setting, mounting, color, and lettering of signs should be appropriate to the park environment and also harmonize with signs used by adjoining trail systems. The accepted standard for signs comes from the *Manual of Uniform Traffic Control Devices* (MUTCD). The *NPS Sign Manual* defers to the MUTCD for trail signs, though it also recommends the use of white-on-brown recreational symbols. At present, though, no symbol is popularly understood to indicate a multi-purpose trail, and there are no complete standards for the variety of signs needed in a recreational setting – regulatory, directional, interpretive, hazard, warning, and "etiquette" signs.

The MUTCD bicycle symbol (sometimes used with a directional arrow), though commonly used, is inadequate because it does not give trail users a sense of where they are and what to expect. By itself, the bicycle symbol is almost worthless, since it gives none of the information about directions, trail condition, or route length that trail users need for reassurance.

Where there is a choice of trails, signs should indicate a preferred route; the FHWA suggests "pathfinder" signs or pavement symbols (1986, pp. 163-182). Another way to reduce ambiguity is to develop a trail blaze that marks main trails by color, logo, or number. The District of Columbia, for example, is using trail blazes for on-street routes. Since many District of Columbia routes cross or run along NPS park land, signs for the two systems should be coordinated. For simplicity's sake, single trails should be given discrete identities, rather than entire loops.

Signs are critically needed at many downtown trail intersections near Potomac River bridges and at the intersections of loop systems. Signs are needed at these locations:

The Mall
Rosslyn Circle
Theodore Roosevelt Bridge, east and west ends
Memorial Bridge, east and west ends
Mount Vernon Trail at Four Mile Run
Rock Creek Trail at Virginia Avenue
Rock Creek Trail at C & O Canal
Rock Creek Trail at Constitution Avenue
C & O Canal at connector trail to Key Bridge
Oxon Cove

Formalizing principal entrances and interfaces throughout the system with park signs and information panels would emphasize NPS identity and help visitors. Park entrance signs should be posted at the following places:

Existing:

Memorial Bridge, Virginia side
Rock Creek Park at the Montgomery County line
Ends of the Fort Circle system
C & O Canal at Georgetown
Georgetown waterfront under the Aqueduct Bridge
Mount Vernon Trail south of Alexandria
Mount Vernon
Trail bridge entering GWMP at Rosslyn

Future:

Intersection of trails near Fort Lincoln along the Anacostia River
The Crystal City connector tunnel
Oxon Cove at the DC line
Ends of the Potomac Heritage Trail

Sign Purposes

A sign system should serve at least three major purposes. It should promote safety, encourage appropriate trail etiquette, and supply interpretive information.

Safety. Safety on trails is, of course, not simply a matter of signs. Some observers along the Mount Vernon Trail feel, for example, that users themselves cause almost all the accidents there, through excess speed, carelessness, arrogance, and ignorance of their equipment. In some places, poor sight-distances contribute to accidents. But the indiscriminate use of STOP signs also plays a part. Many cyclists ignore STOP and YIELD signs at intersections, along roads, and along on-street trails when a proliferation of signs makes them easy to ignore. STOP signs should only be installed under the correct warrant procedures. Signs with the NPS arrowhead and other identifying insignia should always include space for safety messages. Combined with educational programs, caution and warning signs, lane striping, and clear directionals may play a more critical role in improving safety than merely improving physical facilities, such as surface and alignment.

Trail etiquette. To encourage better trail etiquette, signs posted as necessary might say "Bikers, Yield to Pedestrians, "Keep Right Except to Pass," "Keep Right," "Ride Single File," "Give Advance Warning Before Passing," and "Wear Your Helmet." Particular importance should be paid to convincing motorists that cyclists and other people along or near roads have equal rights to the use of the roads.

Interpretive information. Signs should provide interpretive information about the natural and cultural sites through which trails pass. These signs are especially effective if they are keyed to thematic maps and brochures (see discussion below).

Map Planning Considerations

Maps are more flexible, less expensive, and more informationally complete than on-site signs. Individual maps for the five NPS areas should identify paved trails and major connections to local and regional trails. Some of maps could show on-street connectors or routes by-passing congested areas. Each should describe the condition of the trail and where to expect problems. Ideally, maps should also show parking access, picnic spots, rest-rooms, and water fountains. At present, the only such information available is a brochure describing the Mount Vernon Trail.

The problem with maps is that trail users do not always have access to them, especially the many out-of-town visitors who use trails in the Washington area. For that reason, maps should be available at many locations – at trail entrances, bicycle shops and kiosks along popular trails. Ideally, the metropolitan system should be documented both ways – with signs and pavement markings as well as with good maps – and other park agencies and jurisdictions should produce maps showing how their trails tie into NPS trails.

Brochures

According to the Mount Vernon Trail patrol, the belligerence of high-speed cyclists and the inattention of inexperienced cyclists cause most trail accidents. As a remedy, they recommend user education and safety awareness programs. A brochure co-produced by

user groups and the National Park Service, perhaps titled "Have You Outgrown These Trails?" might, for example, encourage high-speed cyclists to use on-street routes.

Brochures on special topics – "How to Shorten Your Commute," for example – could be developed for trail users. So could brochures on special themes – "Seeing the Fort Circle Parks by Bicycle," "Scenic Views along the Potomac Shoreline," or even "The Bridges of Washington by Bicycle." Other possible themes include the L'Enfant Plan, statues and monuments, the stream valley parks, gardens and arboreta, scenes from the life of George Washington, homes of past presidents, and key sites in Afro-American history.

Such brochures could be initiated by the Park Service or a coalition of park and recreation advocacy groups. Funding could be shared by the NPS, user groups, and the bicycling industry.

To maximize visitor safety, brochures (and posters) should promote the use of bicycling helmets and gloves. All NPS photographs showing cyclists and ranger patrols should set a good example by showing safety helmets and gloves. (As a result of such efforts already, the D.C. area leads the nation in helmet use.)

In summary, combining signs, maps, and brochures in an integrated information system should be a key component of trail planning. Such a system costs much less than installing and maintaining trail pavement, yet immeasurably enriches the trail user's experience.

MANAGEMENT RECOMMENDATIONS

Besides the normal procedures for project initiation, funding, planning, design, and construction, the National Park Service should take other actions to round out its trail program in the National Capital Region.

Participate regularly in the Council of Governments (COG) *Bicycle Technical Advisory Subcommittee.*

Encourage COG to develop a *metropolitan-area trail manual* to coordinate design, construction, signing, operations, funding, and monitoring of paved, multi-use trails.

Establish regular contact with *interest groups* affected by NPS paved trails, perhaps through newsletters, symposiums, conferences, public workshops, or trail completion ceremonies.

Acknowledge support for NPS efforts, such as the recent resolution by the Potomac Pedalers Touring Club supporting an expanded trail system (see Appendix C).

Work with U.S. Department of Transportation (DOT) to have projects listed in the *"3C" planning process* to obtain funding.

Apply for U.S. Department of Transportation *funds* for commuter-used routes (especially bridge connections) and help ensure critical projects are listed on state capital improvement lists. COG could play a key role in coordinating this across the metropolitan area.

In cooperation with COG or another metropolitan organization, develop a *manual on trail details* that encourages visual consistency and ease of maintenance. The details discussed should include those that have proved successful in similar situations.

Nominate trail segments, loops or an entire trail system as National Recreation Trails for inclusion by the Secretary of the Interior in the *National Trail System.* Trails leading to the Mount Vernon Trail and the C&O Canal towpath can also be certified as connectors to the Potomac Heritage National Scenic Trail.

Develop an *NPS trail map* for the entire metropolitan area, showing connections to other systems and notes on trail conditions. This should be updated every 2 to 5 years as conditions change. (Estimated cost for a run of 30,000 is $8,000 plus the cost of layout and artwork.)

Initiate one or more *interpretive trail routes* through the metropolitan area, with a map-brochure keyed to interpretive signs at key sites. Bicycle companies and dealers could be approached to fund the start-up costs for such a program.

Systematically evaluate existing and proposed projects for usability by *special populations.*

Within each park, initiate or strengthen gifts catalogues and similar *donor programs* to bring in private and matching funds for recreation-related trail projects ineligible for DOT funding.

Encourage park staff to participate in trail safety *workshops.* Cycling clinics sponsored by the Park Service or local cycling groups could take place in the parks, in neighborhood recreation facilities, or in schools.

Encourage *volunteers* to help with trails. Work projects, demonstration projects, and "adopt-a-trail" programs can be matched with interested individuals and groups.

Install electronic counters, such as those now in use along the Mount Vernon Trail, to *measure trail use* over time and ascertain changes. Advocate the use of these counters by others to establish a wider base of data for the entire area.

Celebrate accomplishments with opening ceremonies, anniversaries, and awards so that those who participated get credit for what they have done.

RECOMMENDED MAINTENANCE ACTIONS

The following actions should be funded and staffed as a regular part of park maintenance and operation.

Inspect trails regularly, checking especially for safety problems, vegetation that needs clearing, and signs.

Provide annual evaluation reports to superintendents and the regional office from responsible maintenance divisions that outline problems and recommend solutions. These could be called "trails inventory and condition assessments."

Conduct semi-annual meetings of the five superintendents (GWMP, CHOH, ROCR, NACC, and NACE) to discuss common concerns, problems, safety issues, etc. Representatives of major user groups and other governmental bodies could attend as appropriate.

Prepare a regional manual on trail maintenance and details to promote visual and functional uniformity. This might be sponsored and produced by the Washington Area Council of Governments (COG) for use by all agencies that manage trails.

Enlarge trails crews for three parks: GWMP, ROCR, and NACE.

Use more volunteer help for inspection, evaluation, and some maintenance, such as trail cleaning.

Establish bike-mounted patrols for the C & O Canal towpath, Rock Creek Park, and National Capital Parks-East that are similar to the Mount Vernon Trail patrol.

Develop a separate code for bicycle accidents along trails so that accident records are more accurate.

Give greater attention to ice and snow removal. Once ice hardens, it remains for weeks; if it is promptly removed or melted, trails in the D.C. area are usable all winter.

Certain tips may be useful for on-site maintenance crews.

Bumpy root areas near trees should be smoothed every few years. Otherwise, trail surfaces break up and become unsafe.

Large maintenance vehicles should not be driven on narrow trails where the wheels can damage trail edges.

Reflectorized signs or temporary barriers should be posted in hazardous areas such as flooded zones, washouts, and downed trees. Temporary obstructions, such as posts, potholes, or railings, should be painted reflective yellow or orange for visibility.

VI. RECOMMENDED CONSTRUCTION PROJECTS

Many of the opportunities for improving the NPS trail network are, as the preceding section demonstrates, programmatic and informational. In many instances, coordination with other agencies and governments would allow National Park Service to complete useful projects at little or no expense to the government. The next most cost-effective projects would be to bring existing facilities up to accepted standards. Most expensive, but perhaps most valuable to future generations, would be the creation of new trails to integrate and enlarge a comprehensive metropolitan trail system.

The potential exists in the Washington metropolitan area for a region-wide system of trails with a hierarchy of sizes and functions. Realizing this potential requires setting priorities, however. To help realize this potential, this report recommends that the National Park Service help create six interjurisdictional, interlocking trail loops that connect to five regional trails. This would produce a trail system more than 150 miles long serving a large number of urban and suburban communities within the Capital Beltway.

Dozens of construction projects are proposed and described in the following pages, by implementation strategy, by loop system, by priority, by park, and by cooperating agency. Several of these projects help to implement the loop trail system. The chapter concludes with a detailed discussion of 11 top-priority projects.

THE LOOP SYSTEM

The system of interlocking loops would consist primarily of the following trails:

The Arlington Loop: Custis Trail, Four Mile Run Trail, and Mount Vernon Trail along the Potomac shoreline (connecting to the W&OD Trail and Mount Vernon).

The Alexandria Loop: Braddock Road, Holmes Run, and the Mount Vernon Trail along the Alexandria waterfront.

The Little Falls/Rock Creek Loop: Capital Crescent Trail (formerly known as the CSX Georgetown Branch) connecting to the Rock Creek Trail in Chevy Chase and downtown (connecting to the C&O Canal towpath).

The Capital Crescent/Sligo Loop: encircling the city through the Maryland suburbs on the Capital Crescent Trail, Silver Spring, Sligo Valley, Northeast Branch Valley, the Anacostia shoreline, and Mall trails (connecting to the C&O Canal towpath, the Greenbelt connector, and the Potomac Heritage Trail).

The Henson Creek/Oxon Run Loop: joining fragments of trail along these creeks with new trails along Suitland Parkway and the Potomac shoreline (connects to the Potomac Heritage Trail).

Potomac Shoreline Loop: using bridges and shoreline trails on both sides of the Potomac from Key Bridge south to the Woodrow Wilson Bridge, this loop joins all the others.

Two proposed trails outside NPS areas would augment this system of loops: a Metropolitan Branch rails-to-trails conversion along the CSX tracks from Silver Spring to

Union Station, and a District of Columbia bikeway along the reconstruction of the Suitland Parkway from the Frederick Douglass Bridge to the Maryland line.

Specific projects associated with these metropolitan loops are listed later in this chapter.

PROJECTS BY IMPLEMENTATION STRATEGY

Some of the projects considered below were nominated in the WABA trails evaluation, others were suggested by park staff or local bicycle coordinators, and a few were observed by the planning team. Some projects are the responsibility of NPS alone, while others require cooperation and coordination with other agencies and jurisdictions. All the projects are listed below by park and implementation strategy.

The *letter code* represents the park in which each project is located:

C C & O Canal National Historic Park
E National Capital Parks--East
G George Washington Memorial Parkway
M National Capital Parks--Central (Mall area)
R Rock Creek Park

The *number* indicates implementation strategy:

10 series – Projects on existing NPS trails
20 series – New projects that expand the NPS trail network
30 series – Projects requiring cooperation with others
40 series – Projects fully the responsibility of others, but from which NPS can benefit.

The projects are not listed in order of priority; participating agencies are listed for projects requiring cooperation and projects fully the responsibility of others.

Improvement Projects on Existing NPS Routes

C 10 Repair towpath near Great Falls, especially providing smooth alignments as alternatives to rough, rocky areas.

C 11 Establish a clearly marked connecting route from the Georgetown shoreline trail to Key Bridge and the Mount Vernon Trail across the Potomac River in Virginia. This project must also include a pedestrian link to the C & O Canal towpath. (See projects C 20 and C 21).

E 10 Improve the Fort Circle hiker-biker trail between Fort Mahan and Fort Stanton.

G 10 Widen the Mount Vernon Trail wherever possible to 10 feet, or at least 8 feet. This is best done during repaving. In areas of heaviest use (near the city center and major bridges) widen to 12 feet.

G 11 Relocate the trail at Gravelly Point to eliminate conflicts between cars and cyclists in the parking lot. (Park staff have drawn up a plan, but funding is not yet available.)

G 12 Soften curvature and grades at a culvert just north of Daingerfield Island.

G 13 South of Alexandria, straighten sharp curves, seek less steep grades where possible.

G 14 Provide an attractive barrier between the Parkway and the trail north of the airport. This is especially important to protect trail users from on-coming headlights and to protect bikers from falling into fast-moving traffic.

M 10 Improve the pedestrian crossings at Independence Avenue and Madison Drive at 15th Street, widening curb cuts and installing pedestrian-activated signals.

M 11 Replace unsightly curb-fills and wedges with full-width curb cuts, warping the sidewalk as necessary.

M 12 At the Tidal Basin inlet bridge, replace steps in the sidewalk with ramps. Widen the trail and sidewalk to at least 8 feet.

M 13 Repave the roads in Presidents' Park South (the Ellipse) that are periodically used for bicycle races and rallies.

M 14 Widen the trail connections to the 14th Street and Roosevelt Bridges. Provide warning signs and striped crossings at ramps.

M 15 Repair the Maine Avenue sidewalks by the Tidal Basin.

M 16 Replace unsafe drain grates with cross-slot patterns to improve bicycle safety throughout the Mall area.

M 17 Formalize the Maine Avenue sidewalk trail at 15th Street through traffic islands to connect with D.C.'s signed bike route along the waterfront.

M 18 Extend sidewalks along Independence Avenue from French Drive to 23rd Street.

M 19 Widen Kutz Bridge sidewalks and approaches on the south side to relieve pedestrian and cyclist congestion.

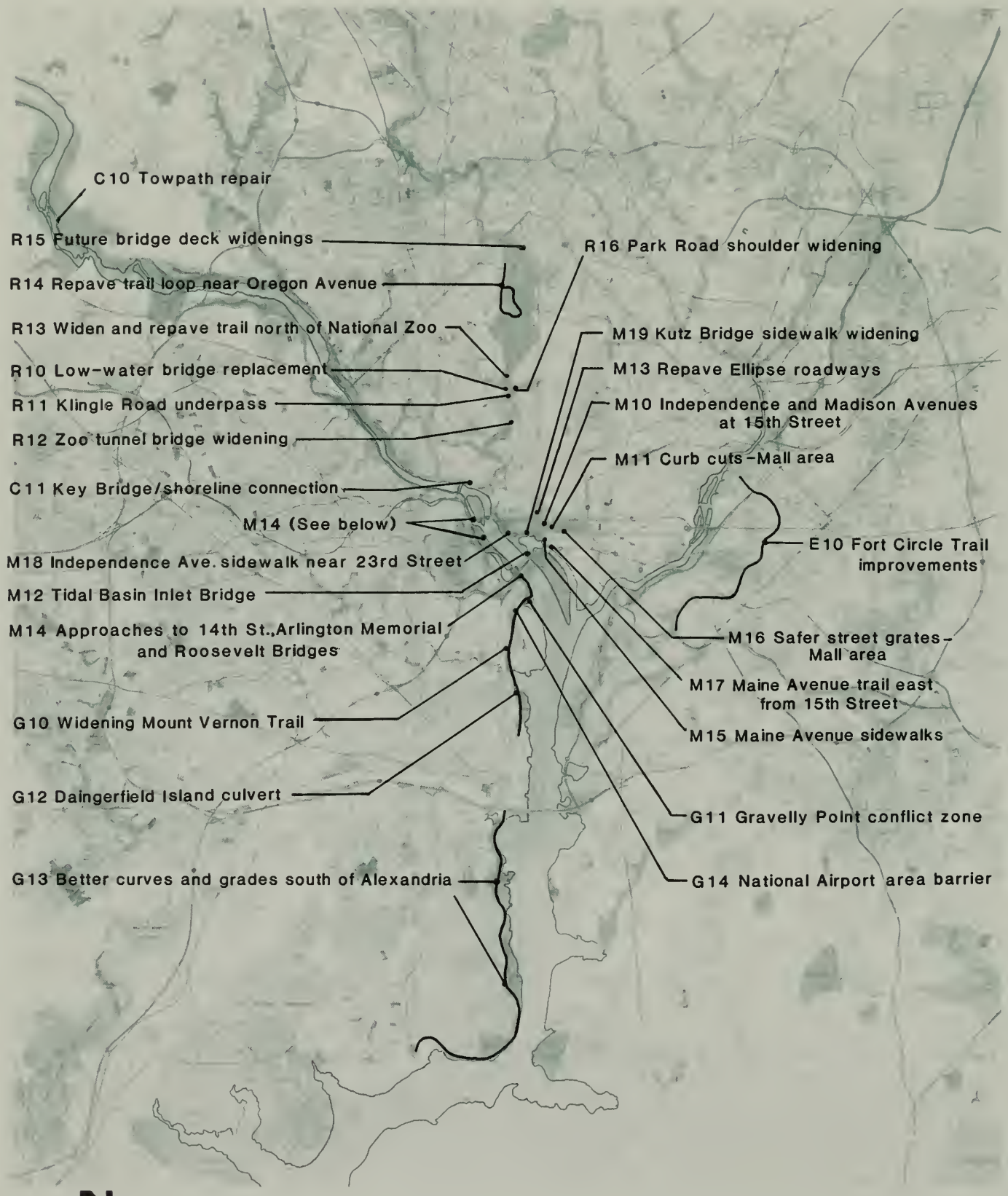
R 10 Replace low-water bridge near Porter Street with a standard flood-resistant arched bridge.

R 11 Increase the vertical clearance under the Klingle Road bridge by Rock Creek.

R 12 Widen bridge sidewalk for trail, just south of the zoo tunnel. As an alternative, build new, separate bridge across creek.

R 13 Widen to 8 feet, remove rough spots, and repave the Rock Creek Trail from the National Zoo north to Broad Branch Road.

R 14 Re-grade, widen, resurface, and sign the Oregon Avenue/Bingham Road loop along the west side of Rock Creek Park.



PROPOSED IMPROVEMENTS TO EXISTING NPS ROUTES

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R 15 When future bridge modifications are made, widen pavement (to 8 feet or more) for two-way trail traffic on bridge sidewalks or curb lanes.

R 16 Widen shoulders where possible along Park Road between Beach Drive and the Piney Branch overpass; replace dangerous grates on the overpass. See Proposed Improvements to Existing NPS Routes, page 58.

New NPS Trail Work

These projects capitalize on the existing trails and strive to make them better by adding new facilities and connecting trails.

C 20 Build a paved trail along the former CSX "Georgetown Branch" railroad corridor paralleling the C & O Canal to reduce visitor conflicts along the narrow parts of the towpath in Georgetown. Indicate that all cyclists would exit near the Canal's crossing of Foundry Branch to follow the new trail to the waterfront (See project C 22).

C 21 Develop a clearly marked waterfront esplanade trail along the entire Georgetown waterfront, with ramps instead of steps, and flush curbs. At the east end by Thompson's Boathouse, the trail should flow easily into connections with the Rock Creek and Potomac River shoreline trails.

C 22 Assuming NPS ownership of the CSX corridor inside the District of Columbia, use the truss bridge over Canal Road and Arizona Avenue to provide safe, grade-separated access to the C & O Canal and Potomac shoreline from northwest Washington. Connecting trails to Montgomery County's nearby trails and roads are included in this project.

E 20 Connect Oxon Cove trails north to Indian Head Highway to the D.C. and Oxon Run trails along Oxon Run.

E 21 Connect Anacostia Park to Fort Dupont along existing NPS lands near the Conrail Railroad bridge. (Planned as part of the Barney Circle improvements.)

E 22 Extend the River Terrace trail south along the Anacostia to the Barney Circle project trails (also planned as part of the Barney Circle improvements.) This project should also include extending the Anacostia Trail north around the Benning Road power plant to connect with the Kenilworth Park trails.

E 23 Develop a gravel hiking trail near the Potomac shoreline through Piscataway Park, as part of Prince George's County's Potomac Heritage Trail. (A paved trail for cycling would stop at Broad Creek.) Use National Colonial Farm's parking (or other nearby public lot) as the eastern trailhead until Charles County's portion is opened, at which time the trail would be extended farther south.

E 24 Install a paved portion of the Potomac Heritage Trail through Fort Foote, using an existing service road alignment. A bridge to cross a small creek and wetland will be required.

G 20 Study and improve the paved trails of Columbia Island, including safe access on and off Arlington Memorial Bridge, access from the Pentagon to the Mount Vernon

Trail, and safe trail passage across and under the Boundary Channel Bridge near Columbia Island Marina.

G 21 Provide a trail connection from the east end of the Crystal City overpass (Virginia Route 233) to the Mount Vernon Trail, preventing further erosion and scenic degradation.

G 22 Construct the new shoreline trail loop as planned around the outer edge of Daingerfield Island.

G 23 Add a gravel and boardwalk interpretive loop at the north end of the Dyke Marsh boardwalk, in part using an abandoned railroad bed.

M 20 Widen the shoreline promenade by the Kennedy Center to reduce conflicts between moving cyclists and standing pedestrians.

M 21 Construct a paved trail parallel to 15th Street, and west of it, from Constitution Avenue south to Maine Avenue, through the edge of the Monument grounds and opposite the Bureau of Printing and Engraving. The trail should minimize conflicts with standing and strolling pedestrians; it would be best built as curb lanes when streets are widened, or as an adjacent lane with the sidewalk moved back next to it.

M 22 Stripe and sign ramp crossings of trail at east end of Memorial Bridge to reduce potential accidents. Improve traffic flow around the Lincoln Memorial. Re-examine crossings for unnecessary or inconsistent YIELD signs. Also indicate destinations and alert pedestrians that bicycles are sharing sidewalks.

M 23 Initiate a study to determine how to create a safer tunnel for trail users under the bridges by the Watergate below the Lincoln Memorial by widening and smoothing trail pavement.

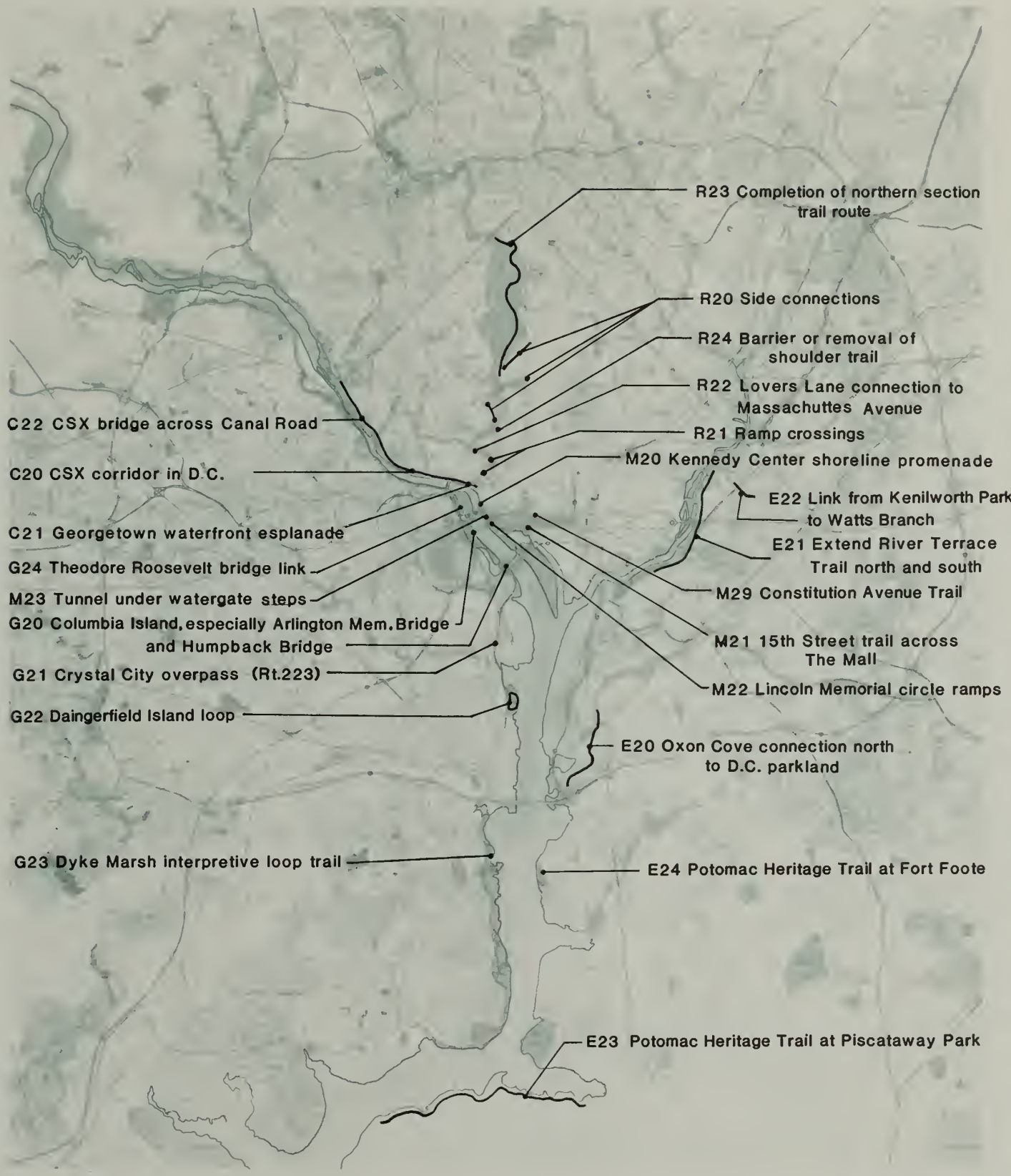
M 24 Improve the trail route along the south side of Constitution Avenue from the Tourmobile lane, around the Lockkeeper's House, across 17th Street, and east to 14th Street across the Washington Monument grounds to minimize pedestrian and bicycle conflicts. The solution could be either a widened sidewalk or a separate paved trail.

R 20 Build more trail connections into Rock Creek Park from adjoining street or sidewalk trails, especially at Piney Branch Parkway, Cathedral and Calvert Streets (also called Shoreham Hill), and Blagden Avenue. These could include either striped shoulder lanes or off-road trails. (See projects R 31 and R 32).

See Suggested New NPS Trail Projects, page 61.

R 21 Create safer ramp crossings for the trail at P Street and Pennsylvania Avenue.

R 22 Connect Massachusetts Avenue to the Rock Creek trail by indicating use of Lovers Lane (now gravel) for bicycles, paving only the lower, steeper portions of the trail along the Dumbarton stream. This requires a bridge across Rock Creek by the gauging station. (In the future this might connect to a relocation of the Rock Creek Trail along the west side of the creek from this point to Shoreham Hill.



SUGGESTED NEW NPS TRAIL PROJECTS

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Another paved connector could eventually follow the Dumbarton stream west all the way to Whitehaven Street near Wisconsin Avenue, unless the landscape preservation project there precludes such a route.)

R 23 Consider ways to complete the Rock Creek trail north from Broad Branch Road for safe use during weekdays.

R 24 Move the trail off the Rock Creek and Potomac Parkway shoulder to promote safety. If this is impossible, install a barrier separating the types of traffic, widening the trail to accommodate heavy use.

See Proposed Barney Circle Freeway Improvements, page 63.

Cooperative Projects

Many of these projects have been suggested by county and city trails coordinators and citizen groups. Some in National Capital Parks--East are part of the Barney Circle Freeway Project. This project is being built by the D.C. government, crossing the Anacostia River just north of Pennsylvania Avenue. In compensation for using parkland along the Anacostia River, a variety of park facilities will be installed in this area, including paved trails on both sides of the Anacostia River between the Benning Road and Martin Luther King bridges. Many of the projects of this category in NACE will tie into the Barney Circle work. If the trails are not built as part of the freeway project, they should be installed later (at least on one side of the river) to make usable the proposed Anacostia River Trail.

C 30 Complete purchase from the current owner of the Georgetown Branch railroad corridor within the District of Columbia.

C 31 Aid community access to C & O Canal in D.C. and Montgomery County by paving or grading informal, unsafe access points, such as Riverside Road in Cabin John, working with the necessary county and community governments.

E 30 Develop the Potomac Heritage Trail from Oxon Cove to Port America, per the Potomac Heritage Trail Task Force report of 1980 (see NCR drawing 851/80,040). Work with Prince George's County to extend the trail to Fort Foote. Urge the interstate commission and federal highway authorities responsible for the Woodrow Wilson Bridge to include a safe pedestrian/bicycle crossing when the bridge is enlarged to link to the Mount Vernon Trail (See project E/G 40).

E 31 Build the paved Potomac Heritage Trail across the mouth of Broad Creek near Harmony Hall, respecting easements and historic features. This would connect to M-NCPPC's trails along Henson Creek.

E 32 Encourage Prince George's County to make an on-street spur trail to Fort ashington from the Potomac Heritage Trail, since the shoreline within the Fort is inadequate for a trail.

E 33 At Oxon Cove, in cooperation with the D.C. government, work to remove unnecessary barriers and posts, completing unpaved segments.

SCALE:
0 1/4 1/2Mile

PROPOSED BARNEY CIRCLE FREEWAY IMPROVEMENTS

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E 34 Connect existing D.C. trails north along Oxon Run to the Suitland Parkway, in cooperation with Prince George's County trail links in that area and D.C.'s proposed trails along Suitland Parkway west of Oxon Run. Such a connection would join the Congress Heights and Naylor Road METRO stations and should be included in mitigations of rapid rail construction.

E 35 Connect the proposed Fort Lincoln trail to the Anacostia shoreline and Kenilworth Park. One way is to work with the District government to extend Eastern Avenue across the Anacostia River to tie the Fort Circle trail to the Anacostia trail. As an alternative, if the U.S. Route 50 bridge is ever widened or rebuilt, include a connecting crossing there. A temporary trail structure hung from the bridge could be installed in the meantime.

E 36 Extend Kenilworth Park trails east along Nannie Helen Burroughs Avenue to Watts Branch and the Fort Circle trails, using D.C. street rights-of-way as necessary.

E 37 Build a new paved trail along the south side of Suitland Parkway between Naylor and Suitland Roads, forming the northern link of the Oxon Run/Henson Creek loop, and connecting to D.C.'s proposed trails along the west end of the Suitland Parkway.

E 38 Explore the feasibility of establishing signed connector routes from major trails (such as the Fort Circle Trail) to significant nearby sites, such as the Frederick Douglass Home. This may involve using on-street routes coordinated with the D.C. government.

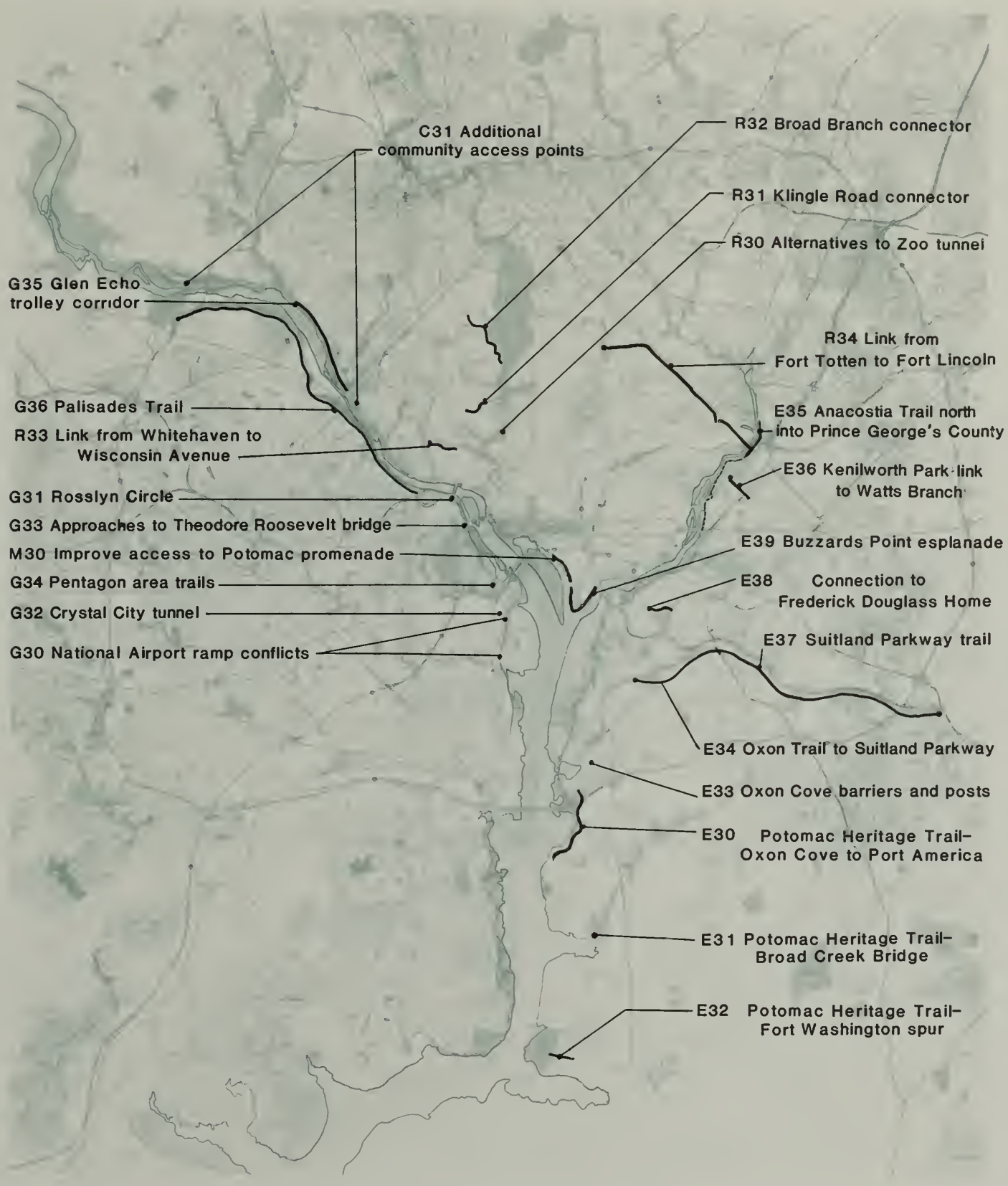
E 39 Complete esplanade development of Buzzards Point to encourage multi-use recreation along the Anacostia River waterfront. Coordinate closely with urban redevelopment authorities there to form a continuous waterfront trail from the Douglass Bridge around Fort McNair to the Washington Channel waterfront.

G 30 Remove unsafe at-grade trail intersections at National Airport by building overpasses. This work will be funded and constructed as part of the renovation of National Airport.

G 31 Clean up trail details around Rosslyn Circle, an important access node to various trails, bridges, and urban routes. This includes sidewalks consistently widened to 12 feet, a consistent sign system, adequate curb cuts, and no-right-turn-on-red (and/or delayed green) posted at exit ramps from the circle. Work must be coordinated with Arlington and District governments, as well as FHWA.

G 32 Complete the trail connection between the Mount Vernon Trail and Crystal City via the existing tunnel under the railroad. This will also serve as a pedestrian access point for National Airport. Both Arlington County and the Airports Authority have an interest in this project.

G 33 Complete adequate links from the Virginia end of the Roosevelt Bridge to the NPS shoreline trail. This could include a spiral or folded trail ramp connecting the bridge sidewalk along the south side to the Potomac shoreline trail below. Planning must be coordinated with the Virginia Department of Transportation, the National Capital Planning Commission, and the Fine Arts Commission.



PROPOSED COOPERATIVE TRAIL PROJECTS

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G 34 Work with the General Services Administration, the Defense Department, Arlington County, and others as necessary to complete both a north-south and an east-west trail route near the Pentagon. In many places fragments of sidewalk, overpasses, and tunnels exist. This project must be closely coordinated with the Columbia Island projects (See G 20).

G 35 Provide an off-road alternative to portions of the MacArthur Boulevard paved trail near Glen Echo by re-establishing federal ownership of the former trolley right-of-way and developing parts of it for trail use. Coordination is required with Montgomery County and D.C. governments, as well as the U.S. Army Corps of Engineers.

G 36 Establish a paved multi-use trail along the top of the Potomac Palisades, paralleling the inbound Parkway. Connecting to Fairfax County's Dranesville Park near the Capital Beltway and following the Parkway's uphill slopes to Spout Run, this trail would then cross the former Uhle Street bridge alignment and connect into the Custis Trail west of Rosslyn. Arlington County's Bicycle Office could take the lead on this project.

M 30 Improve multi-use access and ramps to the Potomac Promenade along Water Street, SW, between M and P Streets, in cooperation with the D.C. government.

R 30 Seek an alternative to off-hour use of the Zoo tunnel for trail users. Encourage the Smithsonian Institution to re-design its security so that the streamside trail can be used 24 hours a day all year without damaging Zoo interests.

R 31 Encourage the D.C. government to include bike lane shoulders along Klingle Road when it is re-built.

R 32 Explore routes along Broad Branch Road, both on the shoulder and in the adjoining park, to install a safe trail route serving northwest Washington and Chevy Chase. Work closely with the D.C. government, which has jurisdiction over the road right-of-way.

R 33 Coordinate a proposed D.C. on-street bicycle route along Whitehaven Parkway to Wisconsin Avenue – perhaps tying in to a future connecting trail farther east through Dumbarton Park (See project R 22).

R 34 Install paved trail between the Fort Totten METRO station and Fort Lincoln. In many places this could be a signed, on-street trail where traffic volumes are low, such as along Gallatin Street. Appropriate markers should indicate crossing trails, such as the Mt. Rainier trail on Varnum Road. Coordination should occur with the D.C. Department of Public Works, neighborhood and community groups, WMATA, and bicycling groups.

See Trail Projects by Others, page 65.

PROJECTS BY OTHERS

These projects relate to NPS trail routes – and may help connect them to nearby trails – but lie entirely outside NPS jurisdiction. None is listed or recommended for the C & O Canal or Rock Creek Park.

E 40 Urge appropriate officials to install a pedestrian and bicycle link across the Potomac River when the Woodrow Wilson Bridge is re-built or enlarged (See project G 40).

E 41 Urge appropriate agencies to implement long-standing open space plans by opening up the Potomac shoreline to trail use from Oxon Cove to the Douglass bridge through Blue Plains, Naval Research, and Bolling Air Force Base. Work closely with the D.C. government and NCPC.

E 42 Encourage Prince George's and Anne Arundel Counties to establish a Washington, Annapolis, and Baltimore inter-city connector trail by using the abandoned WB&A railroad corridor.

E 43 Work with Prince George's County to link Greenbelt Park to Northwest Branch via Good Luck Road.

G 40 Urge the completion of a trail crossing on the Woodrow Wilson Bridge, linking to the National Capital Parks--East trails and the Potomac Heritage Trail (see project E 40).

G 41 Work with Fairfax County to establish an on-street bike route parallel to the Mount Vernon Trail from Belle View Avenue to Vernon View Drive.

M 40 Encourage the Architect of the Capitol and D.C. Public Works to establish east-west bicycle routes past the Capitol, connecting Mall trail traffic to East Capitol Street and Anacostia Park.

PROJECTS BY LOOP

Many of these projects are associated with the metropolitan loop trail system described at the beginning of this chapter.

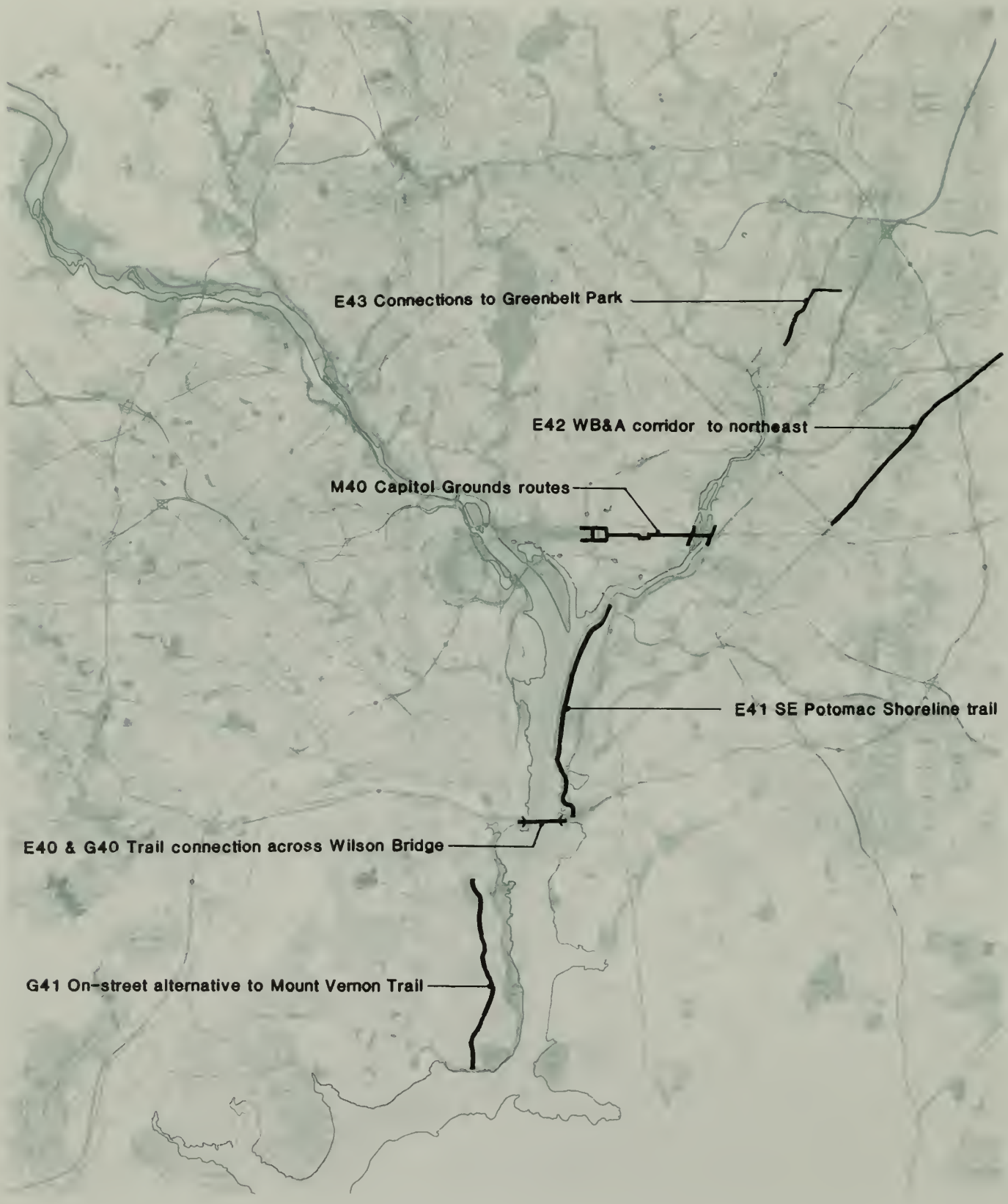
Arlington Loop

G 20 Columbia Island, especially Memorial Bridge
G 31 Rosslyn Circle

Alexandria Loop: none

Little Falls/Rock Creek Loop

C 20 Developing the Georgetown Branch rail trail in D.C.
C 21 Georgetown waterfront esplanade
C 22 Repair for Arizona Avenue bridge across Canal Road
R 10 Low-water bridge replacement
R 11 Klingle Road underpass clearance
R 12 Bridge widening south of Zoo tunnel
R 13 Widen and repave Rock Creek Trail north of Zoo



N

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TRAIL PROJECTS BY OTHERS

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R 21 Ramp crossings at P Street and Pennsylvania Avenue
R 23 Completion of northern section of Rock Creek Trail
R 24 Barrier or removal of trail off road shoulder
R 30 Alternatives to Zoo tunnel

Capital Crescent/Sligo Loop

C 20 Developing the Georgetown Branch rail trail in D.C.
C 21 Georgetown waterfront esplanade
C 22 Repair for Arizona Avenue bridge across Canal Road
C 30 Completion of Georgetown Branch rail corridor purchase
E 35 Anacostia Trail north into Prince George's County
E 36 Link from Kenilworth Park to Watts Branch
E 43 Connections to Greenbelt Park
M 20 Kennedy Center shoreline promenade
M 40 Capitol grounds east-west routes

Henson Creek/Oxon Run Loop

E 20 Oxon Cove connection north to D.C. parks and trails
E 24 Potomac Heritage Trail at Fort Foote
E 30 Potomac Heritage Trail south from Oxon Cove
E 31 Potomac Heritage Trail at Broad Creek
E 32 Fort Washington Spur Trail
E 34 Oxon Run Trail to Suitland Parkway
E 37 Suitland Parkway Trail
E 40 Trail connection across Wilson Bridge

Potomac Shoreline Loop

C 11 Link between Georgetown shoreline trail and Key Bridge
E 30 Potomac Heritage Trail south from Oxon Cove
E 39 Buzzards Point Esplanade
E/G 40 Trail connection across Wilson Bridge
E 41 Southeast Potomac shoreline trail
G 11 Gravelly Point conflict zone
G 12 Culvert north of Daingerfield Island
G 14 Airport area barrier
G 20 Columbia Island trails, especially Memorial and Humpback Bridges
G 30 National Airport ramp conflicts
G 31 Rosslyn Circle
G 33 Virginia approaches to Theodore Roosevelt Bridge
M 12 Tidal Basin inlet bridge
M 14 Approaches to 14th St. and Theodore Roosevelt Bridges
M 17 Maine Avenue sidewalk trail from 15th Street east
M 20 Kennedy Center shoreline promenade
M 22 Lincoln Memorial Circle ramp crossings
M 23 Tunnel trails under bridges by Watergate steps
M 30 Potomac Promenade improvements.

PROJECTS BY PRIORITY

This enormous list of projects can be prioritized in numerous ways. The staff of Rock Creek Park suggested ranking key factors in the following order: safety, cost-effectiveness, network completion, and positive public relations. Based on these factors, the projects were divided into three groups: top, medium, and low priority.

Most of the eleven top priority projects involve major safety problems in areas of significant public use, and all of these should be considered urgent. Several are important links to improving trail access and building the metropolitan loop system. Each top-priority project is described in detail at the end of this chapter.

Top Priority

1. G 20 Columbia Island trails, especially Memorial and "Humpback" Bridges
2. G 30 National Airport ramp conflicts
3. R 30 Alternatives to Zoo tunnel
4. R 10 Replacement of low-water bridge near Porter Street
5. R 23 Completion of northern section of Rock Creek Trail
6. R 32 Broad Branch Connector into Rock Creek Park
7. G 14 Airport area barrier
8. C 20 Developing the "Georgetown Branch" rail trail in D.C.
9. M 22 Lincoln Memorial Circle ramp crossings
10. E 10 Fort Circle Hiker-Biker Trail Improvements
11. E/G 40 Trail connection across the Woodrow Wilson Bridge

Medium Priority

C 22 Repair for Arizona Avenue Bridge across Canal Road
C 30 Completion of Georgetown Branch rail corridor purchase
E 22 Extend River Terrace Trail south and north
E 30 Potomac Heritage Trail south from Oxon Cove
E 33 Oxon Cove posts and barriers
E 35 Anacostia Trail north into Prince George's County
E 41 Southeast Potomac shoreline trail
E 42 WB&A Corridor to Baltimore and Annapolis
E 43 Connections to Greenbelt Park
G 10 Widening Mount Vernon Trail
G 11 Gravelly Point conflict zone
G 12 Culvert north of Daingerfield Island
G 21 Crystal City overpass, Virginia Route 233
G 31 Rosslyn Circle
G 32 Crystal City connector tunnel
G 33 Virginia approaches to Theodore Roosevelt Bridge
G 34 Pentagon area trails
M 12 Tidal Basin inlet bridge
M 14 Approaches to 14th Street and Theodore Roosevelt Bridges
M 16 Safer street grates
M 17 Maine Avenue sidewalk trail from 15th Street east
M 19 Kutz Bridge sidewalk widening
M 20 Kennedy Center shoreline promenade

M 21 15th Street trail across Mall
M 24 Constitution Avenue from 17th to 14th Streets
M 40 Capitol Grounds east-west routes
R 11 Klingle Road underpass clearance
R 12 Bridge widening south of Zoo tunnel
R 13 Widen and repave Rock Creek Trail north of Zoo
R 20 Side connections into park
R 21 Ramp crossings at P Street and Pennsylvania Avenue
R 22 Lovers Lane connection to Massachusetts Avenue
R 24 Barrier, or removal of trail off of road shoulders
R 31 Klingle Road connector

Low Priority

C 10 Towpath repair near Great Falls
C 11 Link between Georgetown shoreline trail and Key Bridge
C 21 Georgetown waterfront esplanade
C 31 Additional community access points
E 20 Oxon Cove connection north to D.C. parks and trails
E 21 Link from Anacostia to Fort Dupont
E 23 Potomac Heritage Trail in Piscataway Park
E 24 Potomac Heritage Trail at Fort Foote
E 31 Potomac Heritage Trail at Broad Creek
E 32 Fort Washington spur trail
E 34 Oxon Run trail to Suitland Parkway
E 36 Link from Kenilworth Park Watts Branch
E 37 Suitland Parkway Trail
E 38 Trail connectors to Frederick Douglass Home
E 39 Buzzards Point Esplanade
G 13 Better curves and grades south of Alexandria
G 22 Daingerfield Island loop trail
G 23 Dyke Marsh interpretive loop trail
G 35 Glen Echo trolley corridor
G 36 Palisades trail
G 41 On-street alternative to Mount Vernon Trail
M 11 Curb cuts
M 13 Repave Ellipse roadways
M 15 Maine Avenue sidewalks
M 18 Independence Avenue sidewalk near 23rd Street
M 23 Tunnel trails under bridges by Watergate steps
M 30 Potomac Promenade improvements
R 14 Repave trail loop near Oregon Avenue
R 15 Future bridge deck widenings
R 16 Park Road shoulder widening
R 33 Link between Whitehaven Parkway and Wisconsin Avenue
R 34 Link from Fort Totten to Fort Lincoln

PROJECTS BY PARK

These projects can also be grouped by park, to help managers establish budgets, set priorities, and track accomplishments. The following list ranks the projects by priority level within each park.

C & O Canal National Historical Park

Top Priority:	C 20	Developing the "Georgetown Branch" rail trail in D.C.
Medium Priority:	C 22	Repair for Arizona Avenue Bridge Across Canal Road
	C 30	Completion of Georgetown Branch rail corridor purchase
Low Priority:	C 10	Towpath Repair near Great Falls
	C 11	Georgetown shoreline trail link to Key Bridge
	C 21	Georgetown waterfront esplanade
	C 31	Additional community access points

National Capital Parks--East

Top Priority:	E 10	Fort Circle Hiker-Biker Trail improvements
	E 40	Trail connection across Woodrow Wilson Bridge
Medium Priority:	E 22	Extend River Terrace Trail south and north
	E 30	Potomac Heritage Trail south from Oxon Cove
	E 33	Oxon Cove posts and barriers
	E 35	Anacostia Trail north into Prince George's County
	E 41	Southeast Potomac shoreline trail
	E 42	WB&A corridor to Baltimore and Annapolis
	E 43	Connections to Greenbelt Park
Low Priority:	E 20	Oxon Cove connection north to D.C. parks and trails
	E 21	Link From Anacostia Park to Fort Dupont
	E 23	Potomac Heritage Trail in Piscataway Park
	E 24	Potomac Heritage Trail at Fort Foote
	E 31	Potomac Heritage Trail at Broad Creek
	E 32	Fort Washington spur trail
	E 34	Oxon Run trail to Suitland Parkway
	E 36	Link from Kenilworth Park to Watts Branch
	E 37	Suitland Parkway trail
	E 38	Trail connections to Frederick Douglass Home
	E 39	Buzzards Point Esplanade

George Washington Memorial Parkway

Top Priority:	G 14	Airport area barrier
	G 20	Columbia Island trails, esp. Memorial and Humpback Bridges
	G 30	National Airport ramp conflicts
	G 40	Trail connection across Woodrow Wilson Bridge

Medium Priority:	G 10	Widening Mount Vernon Trail
	G 11	Gravelly Point conflict zone
	G 12	Culvert north of Daingerfield Island
	G 21	Crystal City overpass, Virginia Route 233
	G 31	Rosslyn Circle
	G 32	Crystal City connector tunnel
	G 33	Virginia approaches to Theodore Roosevelt Bridge
	G 34	Pentagon area trails
Low Priority:	G 13	Better curves and grades south of Alexandria
	G 22	Daingerfield Island loop trail
	G 23	Dyke Marsh interpretive loop trail
	G 35	Glen Echo trolley corridor
	G 36	Palisades trail
	G 41	On-street alternative to Mount Vernon Trail

National Capital Parks--Central

Top Priority:	M 22	Lincoln Memorial Circle ramp crossings
Medium Priority:	M 10	Independence and Madison Avenues at 15th Street
	M 12	Tidal Basin inlet bridge
	M 14	Approaches to 14th Street and Theodore Roosevelt Bridges
	M 16	Safer street grates
	M 17	Maine Avenue sidewalk trail from 15th Street east
	M 19	Kutz Bridge sidewalk widening
	M 20	Kennedy Center shoreline promenade
	M 21	15th Street trail across Mall
	M 24	Constitution Avenue from 17th to 14th Streets
	M 40	Capitol Grounds east-west routes
Low Priority:	M 11	Curb cuts
	M 13	Repave Ellipse roadways
	M 15	Maine Avenue sidewalks
	M 18	Independence Avenue sidewalk near 23rd Street
	M 23	Tunnel under bridges by Watergate steps
	M 30	Potomac Promenade improvements

Rock Creek Park

Top Priority:	R 10	Replacement of low-water bridge near Porter Street
	R 23	Completion of northern section of Rock Creek Trail
	R 30	Alternatives to Zoo tunnel
	R 32	Broad Branch connector into Rock Creek Park
Medium Priority:	R 11	Klingle Road underpass clearance
	R 12	Bridge widening south of Zoo tunnel
	R 13	Widen and repave Rock Creek trail north of Zoo
	R 20	Side connections into Rock Creek Park
	R 21	Ramp crossings at P Street and Pennsylvania Avenue
	R 22	Lovers Lane connection to Massachusetts Avenue

R 24 Barrier, or removal of trail off of road shoulder
R 31 Klingle Road connector

Low Priority:
R 14 Repave trail loop near Oregon Avenue
R 15 Future bridge deck widenings
R 16 Park Road shoulder widening
R 33 Link between Whitehaven Parkway and Wisconsin Avenue
R 34 Link from Fort Totten to Fort Lincoln

PROJECTS BY COOPERATING AGENCY

The following list of projects is arranged by cooperating agency, or institution, in alphabetical order.

Architect of the Capitol

M 40 Capitol Grounds east-west routes

Arlington County

G 31 Rosslyn Circle
G 32 Crystal City connector tunnel
G 34 Pentagon area trails
G 36 Palisades trail

Commission of Fine Arts

G 33 Virginia approaches to Theodore Roosevelt Bridge

Department of Defense

G 34 Pentagon area trails
E 41 Southeast Potomac shoreline trail

District of Columbia

E 20 Oxon Cove connection north to D.C. parks and trails
E 21 Link From Anacostia Park to Fort Dupont
E 22 Extend River Terrace Trail south and north
E 33 Oxon Cove posts and barriers
E 34 Oxon Run trail to Suitland Parkway
E 35 Anacostia Trail north into Prince George's County
E 36 Link from Kenilworth Park to Watts Branch
E 37 Suitland Parkway trail
E 38 Trail connections to Frederick Douglass Home
E 39 Buzzards Point Esplanade
E 40 Woodrow Wilson Bridge trail connector

E 41 Southeast Potomac shoreline trail
G 31 Rosslyn Circle
G 35 Glen Echo trolley corridor
M 10 Independence and Madison Avenues at 15th Street
M 14 Approaches to 14th Street and Theodore Roosevelt Bridges
M 17 Maine Avenue sidewalk trail from 15th Street east
M 30 Potomac Promenade improvements
R 11 Klingle Road underpass clearance
R 31 Klingle Road connector
R 32 Broad Branch connector into Rock Creek Park
R 33 Link between Whitehaven Parkway and Wisconsin Avenue
R 34 Link from Fort Totten to Fort Lincoln

Fairfax County

G 36 Palisades trail
G 41 On-street alternative to Mount Vernon Trail

Federal Highways Administration (FHWA)

E/G40 Trail connection across Woodrow Wilson Bridge
G 14 Airport area barrier
G 20 Columbia Island trails, esp. Memorial and Humpback Bridges
G 31 Rosslyn Circle
G 34 Pentagon area trails
R 20 Side connections into Rock Creek Park
R 21 Ramp crossings at P Street and Pennsylvania Avenue
R 23 Completion of northern section of Rock Creek Trail
R 24 Barrier, or removal of trail off of road shoulder

General Services Administration

G 34 Pentagon area trails

Interstate Commission on the Woodrow Wilson Bridge

E/G 40 Trail connection across Woodrow Wilson Bridge

Metropolitan Washington Airports Authority

G 30 National Airport ramp conflicts
G 32 Crystal City connector tunnel

Montgomery County

C 31 Additional community access points
G 35 Glen Echo trolley corridor

National Capital Planning Commission

E 39 Buzzards Point Esplanade
E 41 Southeast Potomac shoreline trail
G 33 Virginia approaches to Theodore Roosevelt Bridge

Prince George's County and Maryland – National Capital Park and Planning Commission

E 30 Potomac Heritage Trail south from Oxon Cove
E 31 Potomac Heritage Trail at Broad Creek
E 32 Fort Washington spur trail
E 34 Oxon Run trail to Suitland Parkway
E 35 Anacostia Trail north into Prince George's County
E 37 Suitland Parkway trail
E 40 Trail connection across Woodrow Wilson Bridge
E 42 WB&A corridor to Baltimore and Annapolis
E 43 Connections to Greenbelt Park

Smithsonian Institution (National Zoological Park)

R 30 Alternatives to Zoo tunnel

U.S. Army Corps of Engineers

G 35 Glen Echo trolley corridor

Virginia Department of Transportation

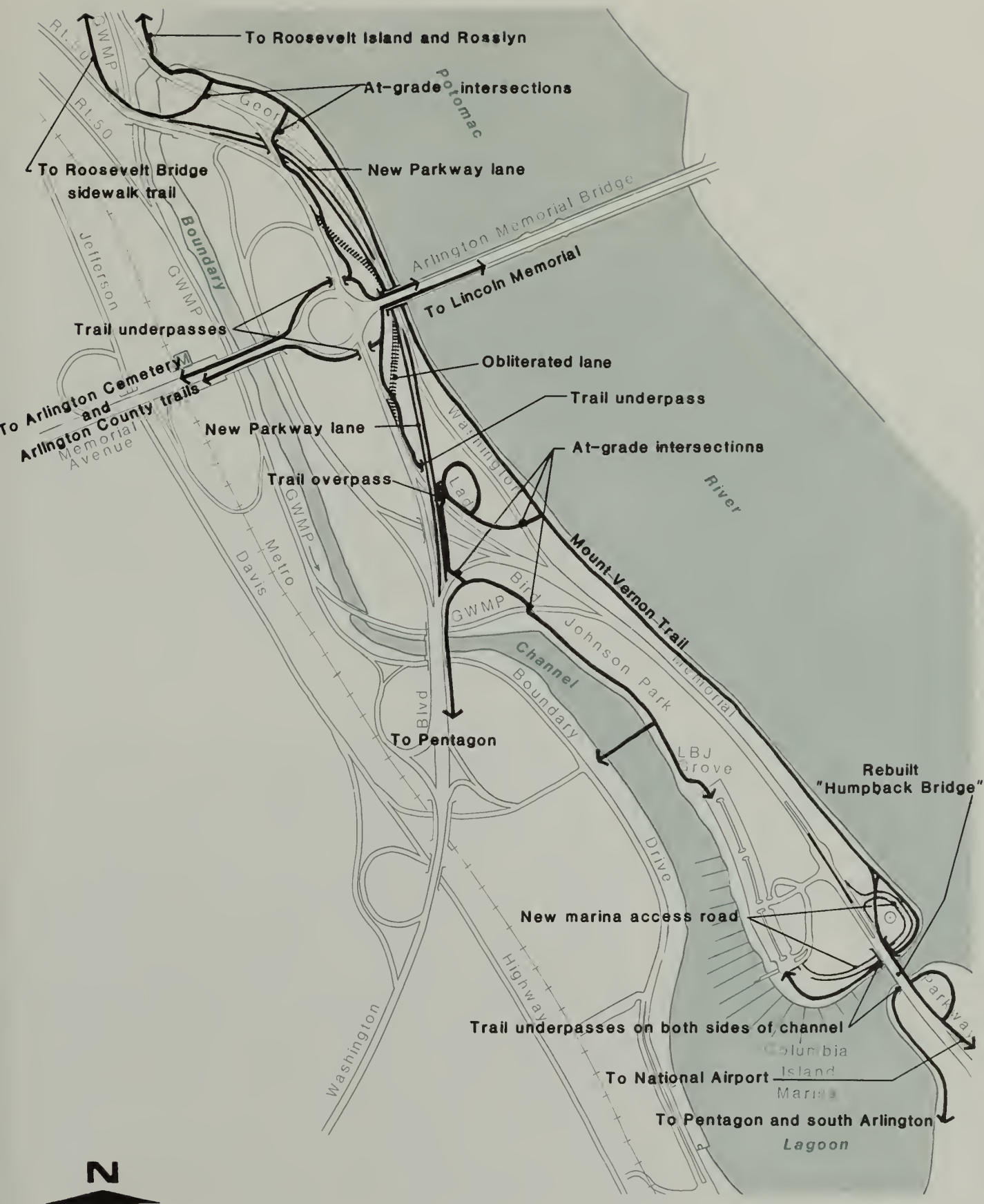
G 21 Crystal City overpass, Virginia route 233
G 33 Virginia approaches to Theodore Roosevelt Bridge
E/G 40 Trail connection across Woodrow Wilson Bridge

Washington Metropolitan Area Transit Authority (WMATA)

E 34 Oxon Run trail to Suitland Parkway
R 34 Link from Fort Totten to Fort Lincoln

TOP-PRIORITY PROJECTS

The following 11 projects are considered higher in priority than the other projects because of safety concerns, heavy use problems or they have the potential of being a key connection in a more complete future trail system. Gross cost estimates (including planning and design) are included where construction costs could feasibly be calculated.



PROPOSED TRAIL LAYOUT FOR COLUMBIA ISLAND

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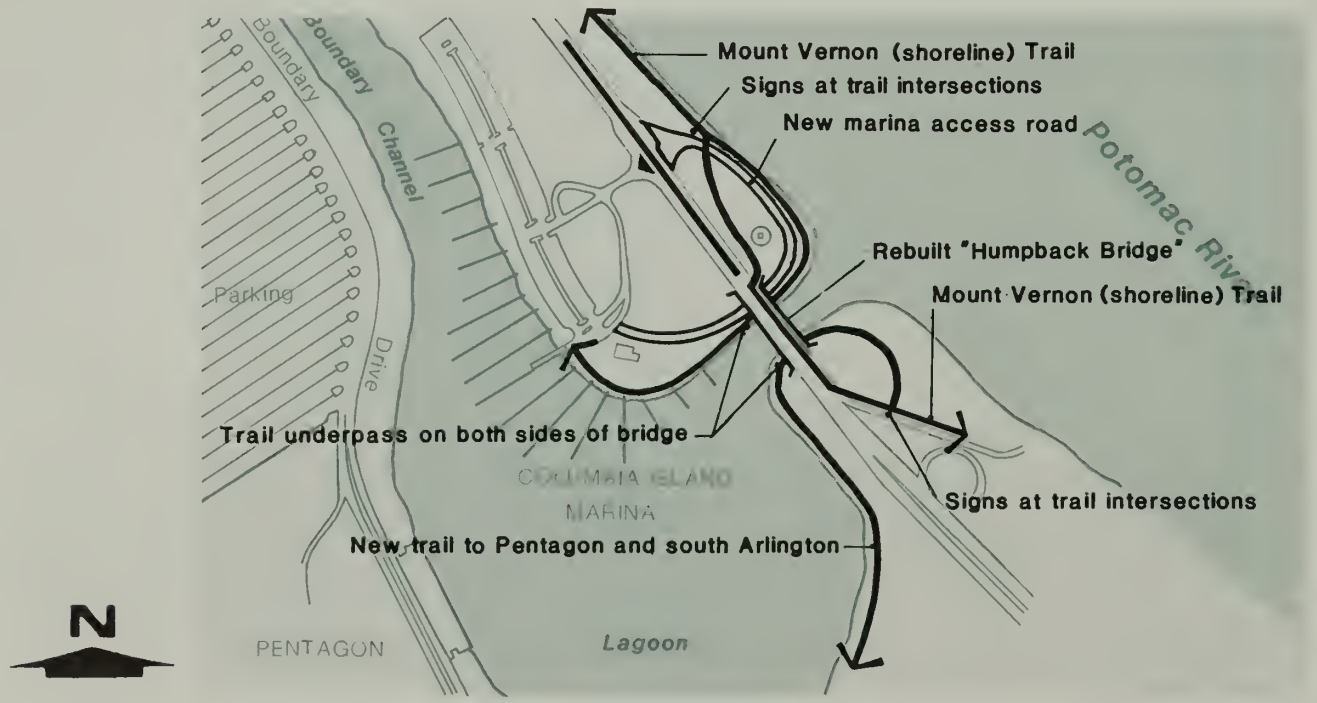
DETAIL STUDY OF MEMORIAL CIRCLE



SCALE:
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DETAIL STUDY OF "HUMPBACK" BRIDGE

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G 20 Columbia Island, Memorial and Humpback Bridges

This project is actually a grouping of several critical projects tied to the upcoming rehabilitation of the George Washington Memorial Parkway. The most crucial problem is the difficulty pedestrians and cyclists have approaching and leaving the Arlington Memorial Bridge and crossing several lanes of speeding traffic. Some wish to go west to Arlington Cemetery, some north to Rosslyn, some down to the shoreline and Mount Vernon Trail, some southwest toward the Pentagon. A number of heavily used commuter bike routes converge here to cross the river.

At the south end of Columbia Island, the "Humpback Bridge," with its narrow sidewalks exposed to fast traffic, impedes safe passage of the Mount Vernon Trail. Several proposals describe a trail route from Columbia Pike and the Pentagon around the south side of Columbia Island Marina lagoon. If this bridge is rebuilt as indicated in recent FHWA plans, such rebuilding should accommodate trail access from all four quadrants, as well as wider protected sidewalks for trail use.

Many solutions to these problems have been proposed over the years. The best ones call for grade-separated trail crossings at the west end of Memorial Bridge, enlarging the Humpback Bridge to accommodate trail crossings both over and under, and completing a coherent set of trails over all of Columbia Island, linking it to the trail routes which surround it. Where the trails lie adjacent to the road (such as across the sidewalks of the Humpback Bridge), they should be at least 12 feet wide and protected from the traffic by appropriate barriers. Night lighting for safety should be considered since this area is one of the most heavily used by commuters year-round.

The most recent recommendation for this complicated area is based on the Bellamo-McGee Study of 1986. Since then, FHWA's 1987 study concludes that the shoreline trail corridor under Memorial Bridge can be widened to 6 feet (narrowing traffic down to two 11-foot lanes), and that all on-grade trail crossings should be perpendicular to roadways. The best long-term solution is to move the traffic intersections west on Memorial Boulevard, eliminating many of the traffic movements into Memorial Circle and under Memorial Bridge (FHWA, 1987, exhibit 49). This would free up the shoreline for safe and scenic access for trail use.

The Humpback Bridge over Boundary Channel at the south end of Columbia Island is to be re-built for three parkway lanes in either direction, plus 12-foot protected sidewalks above on either side and room for a two-way access road below, connecting northbound parkway traffic to the Columbia Island Marina. Such an underpass should accommodate trails on both sides of Boundary Channel, making connections north to the marina and west to the Pentagon and south to Arlington.

Schematic ideas for Memorial Circle and the Humpback Bridge in particular are shown on the next page. Both projects should be considered integral parts of the pending Federal Highway Administration's rehabilitation of this central segment of the Parkway. Until a specific design is established, cost figures cannot be determined. See Trail Layout Proposed for Columbia Island, page 77 and Detail Study of Memorial Circle, page 78.

R 30 Alternatives to Zoo Tunnel

Along the Rock Creek Trail, from the mouth of Rock Creek to the Maryland line, only one segment lies outside the control of the National Park Service – the paved trail which

follows a horseshoe bend of Rock Creek into National Zoo property. Normally this segment is open. But when it is closed by Zoo officials (usually at night in warm months and mid-afternoon in the winter), the only alternative is to pass through the narrow Beach Drive tunnel under part of the National Zoo, alongside high-speed traffic. The narrow sidewalks are three feet wide and have no protection from adjoining traffic and using them is a treacherous experience. Although no accidents have been documented there so far, the hazard deters all but the most adventurous from continuing on the trail.

Alternatives to the tunnel are not easy to discern. One option is for the National Park Service to work cooperatively with the National Zoo to install security gates where the trail crosses the Zoo access road, permitting 24-hour trail use without compromising the need for full security in and around the Zoo. Perhaps this could include automatic gates or an overpass. Either is preferable to future accidents in the tunnel. Without such a safe and certain connection, the continuity of the Rock Creek Trail is compromised. Rough calculations indicate that $340,000 gross would provide a double-fenced, automatic-gated system; $350,000 gross would fund an adequate overpass, fencing, and landscaping. Widening the tunnel itself is considered prohibitively expensive.

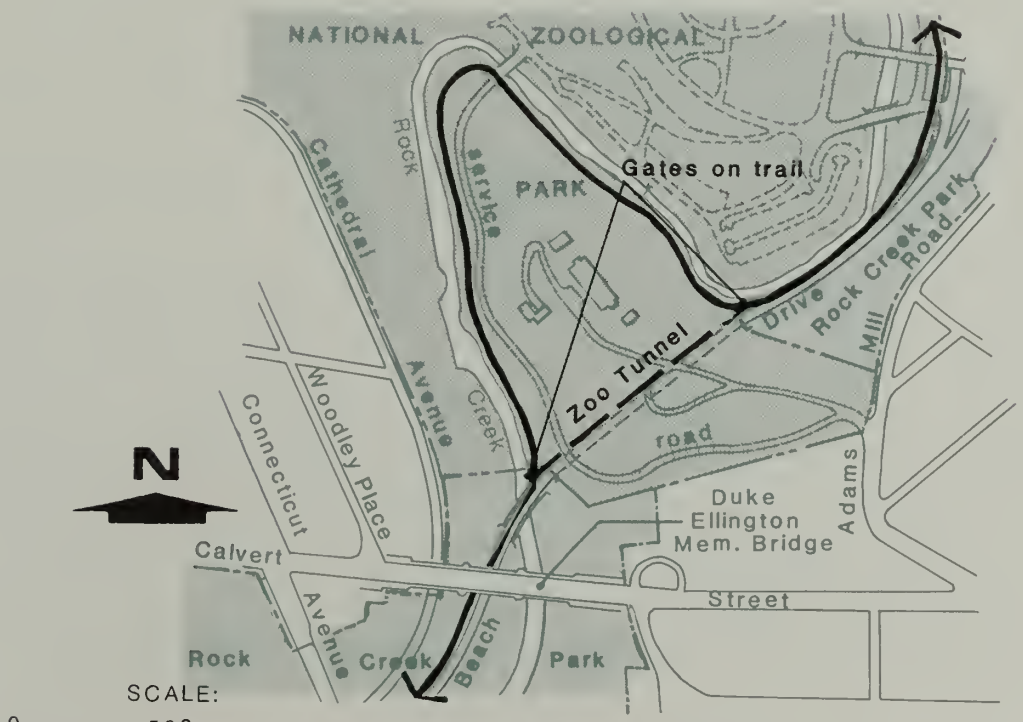
This issue should be addressed by the Zoo in its next master plan. In the meantime, an analysis of trail use and demand when the gates are closed should be made to justify any future solution. An alternative might be widening the Zoo tunnel to install a trail corridor at least eight feet wide next to the roadway, separated from it by a crash-resistant barrier. This arrangement would be much more expensive than either the fenced security system or the overpass. See map, Zoo Tunnel, page 81.

G 30 National Airport Ramp Conflicts

Two adjoining projects are included in this description. They are best described from the WABA report:

> At National Airport, the trail crosses several busy airport entrance and exit ramps. These crossings are currently very dangerous. On summer weekends, trail traffic is so significant that the Airport Authority assigns a traffic policeman to control flow (cars back all the way up to the METRO station). The traffic flow into and out of the airport will soon be changed as part of National Airport's renovation, providing an opportunity to make the Mount Vernon Trail safer. Pedestrian/bicycle bridges for the trail over the new airport entrance and exit roads are recommended.
>
> The Route 233 bridge over the George Washington Memorial Parkway is poorly designed for pedestrian and bicycle access (sidewalks are narrow and unprotected) despite recent renovation by Virginia DOT. There is no connection from the airport terminus of the bridge (east end) to the Mount Vernon Trail immediately below except via steep dirt paths. Construction of the connection is recommended when the airport is renovated. The Park Service should strongly encourage Virginia DOT to reconstruct the bridge with adequate bicycle and pedestrian facilities (WABA pp. 7-8).

One solution to these problems would be to move the entire trail from Gravelly Point to Route 233 to the west side of the Parkway, avoiding ramp conflict areas. This alternative has been considered and rejected, since new overhead trail bridges across the Parkway



ZOO TUNNEL

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and extensive boardwalks along the edge of the Roaches Run lagoon would be needed – marring the parkway's scenic character.

Therefore, the most workable long-term solutions at both crossings include routing the trails so that grade-separated crossings at the ramps can be installed as part of the rehabilitation of National Airport. At this time, it is the understanding of the National Park Service that all design and construction costs for this project will be assumed by the Airport Authority as part of the renovation of National Airport over the next three to five years. Until detailed roadway locations are determined, it is premature to sketch out where such crossings are best located and what their associated costs might be. See map, Northern Section of Rock Creek Park, page 83.

R 23 Completion of Northern Section, Rock Creek Trail

The paved off-road trails in Rock Creek Park follow continuously from the southern end of the Rock Creek and Potomac Parkway north to Broad Branch Road. From there north to the Maryland Line cyclists are forced to share Beach Drive with motorists (hikers and walkers can use nearby foot paths). Alternative routes are hilly, narrow, and indirect and also often involve sharing the roadway with cars.

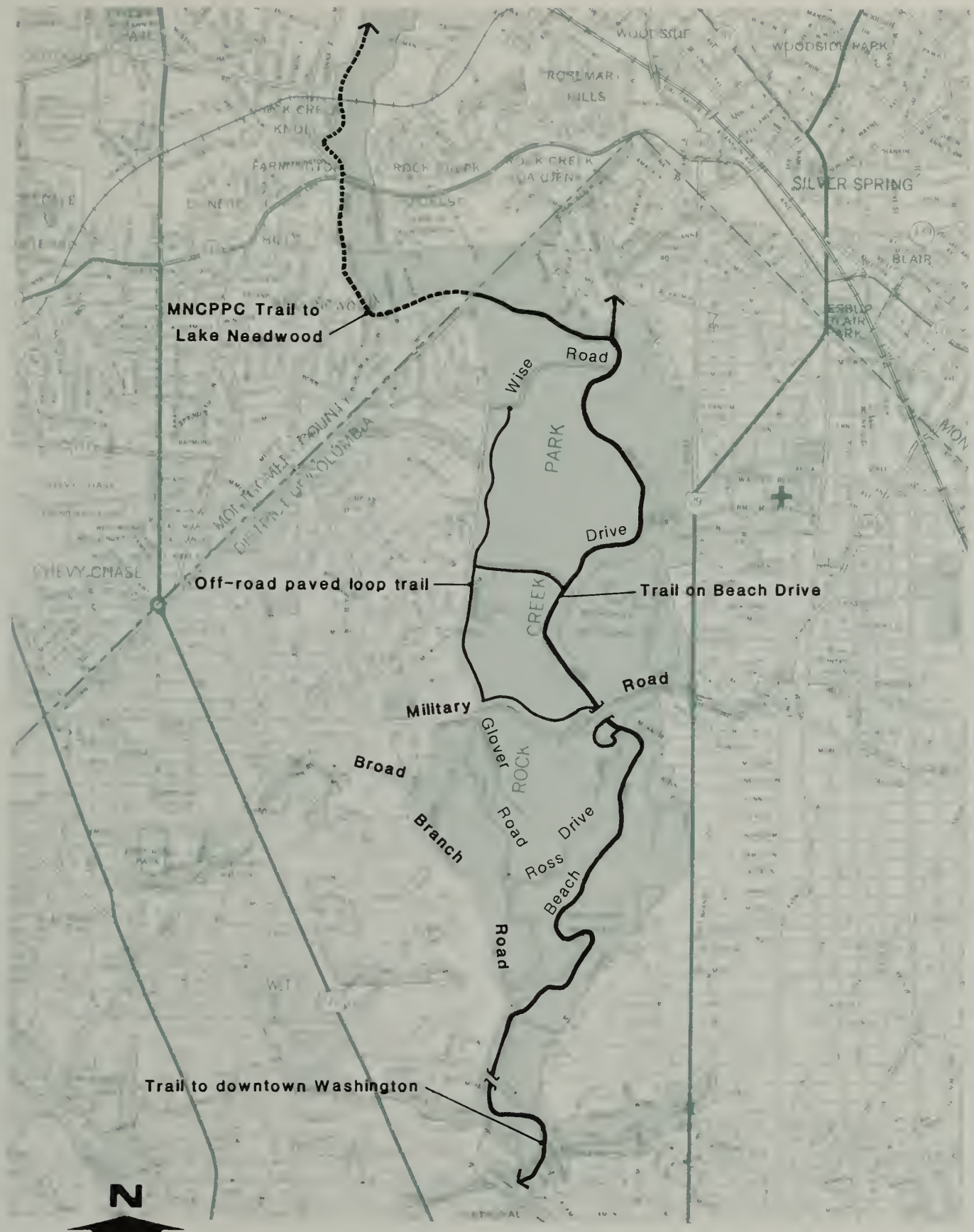
On weekdays the situation can be dangerous on the narrow, curving road. Motorists resent having to share the road with slower cyclists, while the cyclists often avoid the route altogether since it is considered so unsafe. On weekends, the northern section of Beach Drive is closed to cars for the safe and exclusive use of cyclists, joggers, runners, and walkers.

In 1979, an NPS study presented nine ways to connect the existing trail to the northern boundary of the park, but none of the recommendations was implemented (NPS, 1979). Today, the park staff recommends that no new paved surfaces be installed in what is by law a natural area.

WABA suggested several ways to accommodate both cyclists and motorists safely:

> Close Beach Drive to cars on weekdays as well as weekends, providing a parallel automobile route along Ross Drive.
>
> Close one lane of Beach Drive to cars to accommodate two-way trail use, providing an alternate auto route on Ross and Glover Drives.
>
> Route cyclists uphill on Glover and Ross Drives as an alternate to Beach Drive. (The long, steep grades on this route are strenous and suited only for the well-conditioned cyclist.)

None of these would be easy to implement because of the adverse effect on automobile traffic. Reversed traffic necessitates extra signs, gates, and potential safety problems. However, as long as the Rock Creek and Potomac Parkway lanes are switched at rush hour, a similar system could be instituted along Beach Drive. If 4-foot bicycle trail lanes are striped on either side of the roadway, leaving a 10-foot one-way lane in the middle, automobile traffic could reverse at midnight and noon (low-volume times) and trail users could use the edges of the pavement in both directions at all times. The installation cost for such a system has been estimated at between $60,000 and $100,000 for lane striping, signs, barriers, and public notices. FHWA's 1988 study of the Rock Creek Park road



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NORTHERN SECTION OF ROCK CREEK PARK

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system recommends both abolishing the reversed rush hour lanes on the Parkway and closing Beach Drive to motorized vehicles (FHWA, 1988, pp. i,ii). If and when the reversed traffic flow along the Rock Creek and Potomac Parkway is abolished, the consequences for cyclists and pedestrians in the northern section of the Park must be considered. In the meantime, explorations should continue to determine both a scenic, comfortable trail route from Wise Road north and west into the Montgomery County portion of Rock Creek Park and a valley floor route from Broad Branch north to Wise Road.

R 10 Replacement of Low-Water Bridge near Porter Street

The creek crossing near the Porter Street and Klingle Road bridges has been a chronic problem and is a common site of accidents. The approaches are narrow and have difficult grades or inadequate curvature. The low-water bridge was an attempt to accommodate flood waters without damaging an expensive structure. Unfortunately it acts like a small dam in floods and causes a build-up of debris. Often the concrete deck panels are carried away, rendering the bridge useless to trail users until the panel is replaced.

Design and funding for a replacement bridge are well under way. The bridge will be a pre-engineered 100-foot wood span, with gentle, landscaped approaches. The conceptual design has been approved by the Fine Arts Commission and the National Capital Planning Commission. Funding will be shared with the U.S. Forest Service under a special cooperative program at about $100,000.

R 32 Broad Branch Connector into Rock Creek Park

Along the southwest flank of Rock Creek Park, Broad Branch Road twists and turns alongside a small stream, joining Beach Drive to the road network of northwest Washington and Chevy Chase. Rough pavement, narrow lanes, poor sight distances, fast traffic, and blind intersections all contribute to a hazardous cycling experience, yet this is one of the most gently graded access routes into the Rock Creek valley.

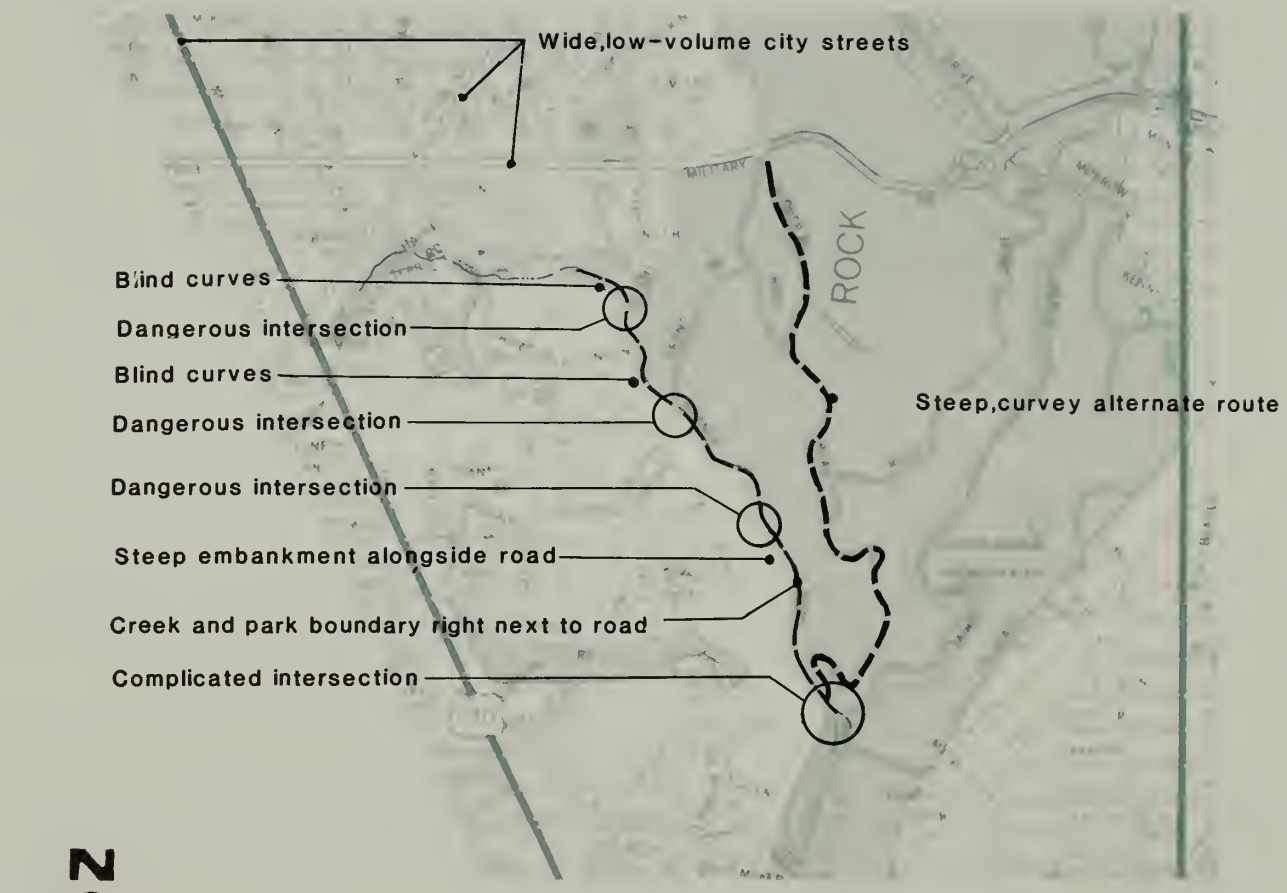
Despite the problems along this route, a significant number of cyclists use it to approach the park. Currently, the Maine-to-Virginia regional bicycle trail is mapped along this road. The Broad Branch Road corridor should be carefully examined by both D.C. and NPS trail specialists and a joint project initiated to provide a safe and scenic trail experience along this tributary valley.

An initial survey indicates that a combination of 5,330 linear feet of 8-foot-wide off-road trail, 1,660 linear feet of 8-foot-wide paved trail cantilevered on top of a stream bank retaining wall, and seven 10-foot-wide stream bridge crossings (5,250 square feet) would cost about $3.2 million gross. This cost could be split 50%-50% between NPS and D.C. since the trail would straddle the property line of the park along the road right-of-way. See map, Broad Branch Road Corridor, page 86.

G 14 Barrier in Airport Area

Along the Mount Vernon Trail, just north of the National Airport, the trail is wedged between the shoulder of the Parkway and the airport's perimeter fence. At this point, the fence is a solid wall ("blast fence"). Especially at night, this situation places cyclists in

A low-water bridge near Porter Street on the Rock Creek Trail acts as a dam in floods and causes debris to build up. A new bridge is currently being designed.



BROAD BRANCH ROAD CORRIDOR

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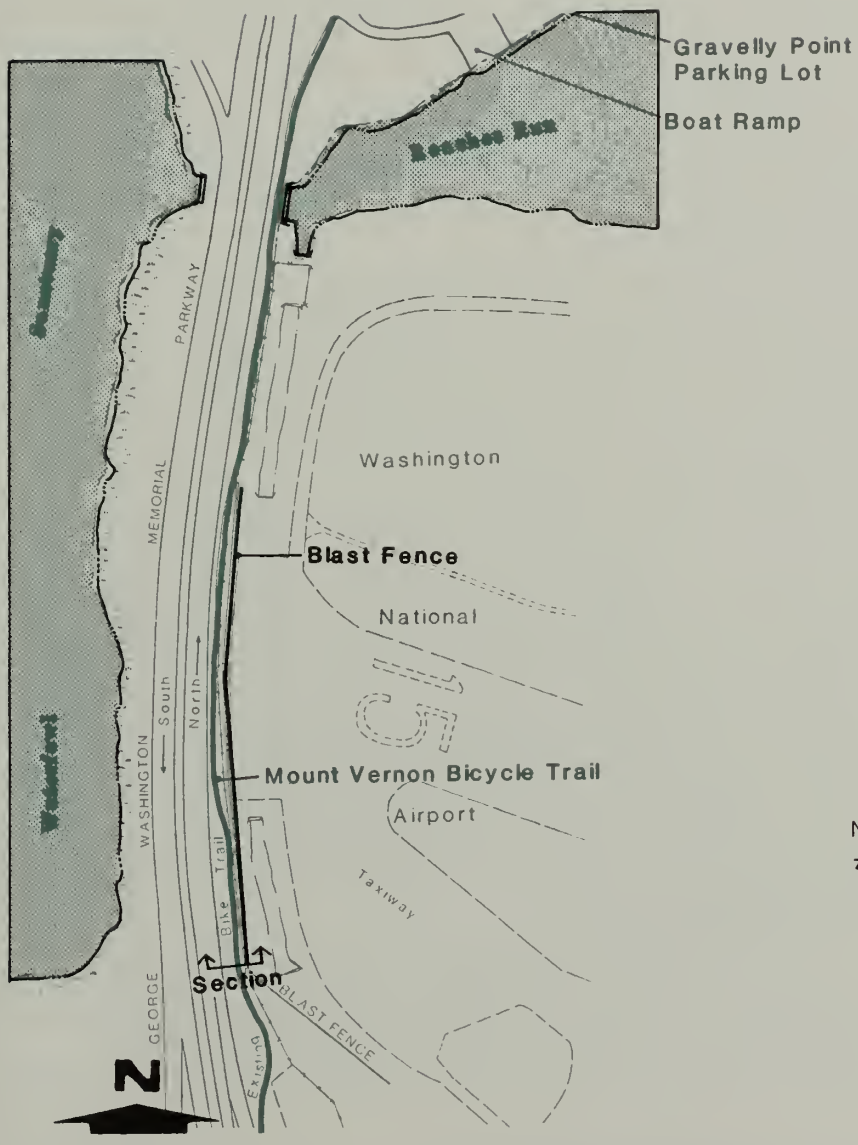

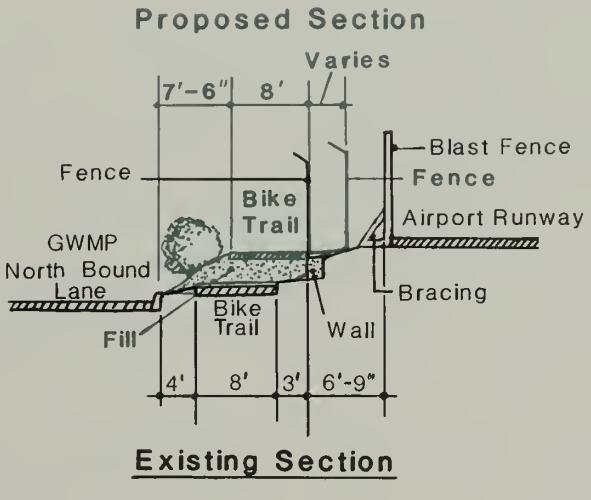

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AIRPORT AREA BARRIER

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proximity of fast car traffic and the glare of headlights, making it a very unpleasant and potentially hazardous experience.

During the rebuilding of the airport, the National Park Service should negotiate with the Airport Authority to create a comfortable and safe trail corridor in this area. This could be achieved through plantings and a crash-resistant barrier, as long as the final effect is not one of isolation and danger. Extending the low stone-faced wall and augmenting the narrow bands of shrubs with more plantings and a crash-tested barrier between the trail and the Parkway would go far in solving this problem. With lights, total cost for such a project would be about $110,000 gross. This could be negotiated as part of the upgrading of the National Airport.

C 20 "Georgetown Branch" Rail Trail in D.C.

In 1904 a railroad spur was built from Silver Spring, Maryland, to the Georgetown Waterfront, circling around the northwest side of the District of Columbia, and entering Georgetown alongside the C & O Canal. Recently it was abandoned by the CSX Corporation and is being considered for a transit and trail corridor connecting various suburbs. A current trail corridor project that encompasses this space refers to it as the Capital Crescent Trail.

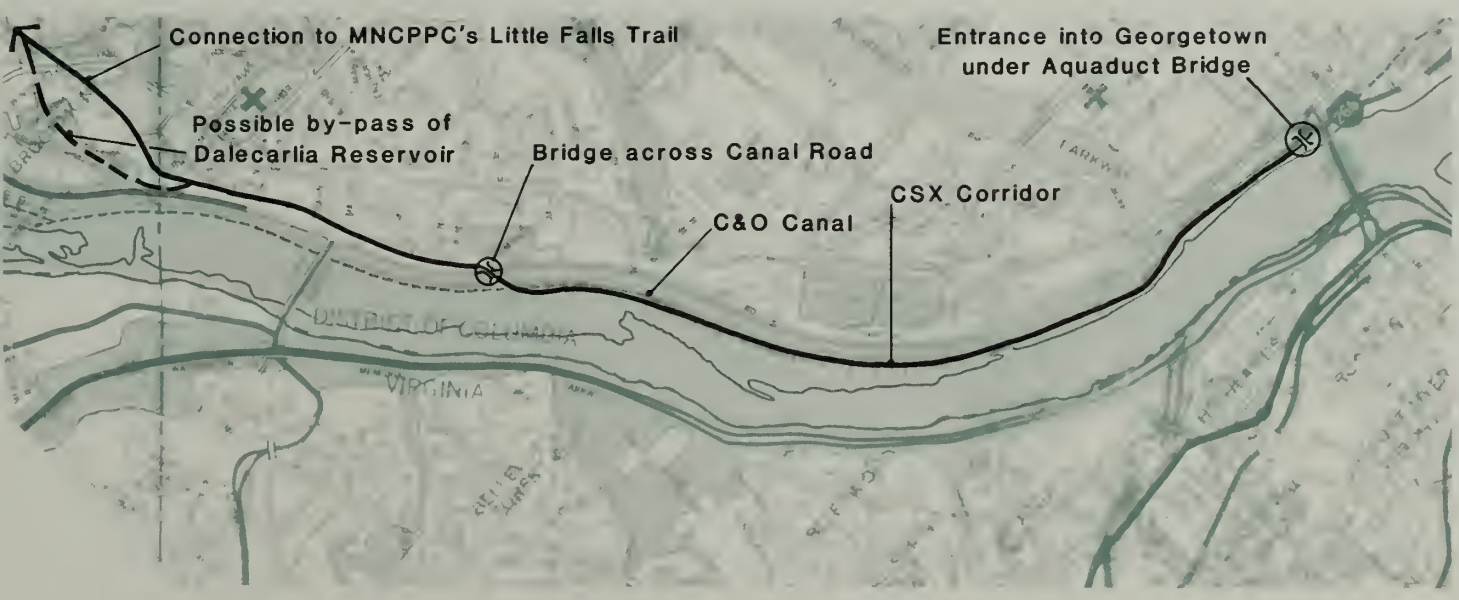
Within the District of Columbia, the railroad is intimately associated with the Canal and should not be used for purposes harmful to the Canal's scenic and historic purposes. It is recommended that the government acquire this corridor and pave as an all-purpose trail those portions appropriate for trail development.

At the west end, trail connections across Canal Road and north into Montgomery County should be made for both increased community access and the opportunity for another regional loop trail (see projects C 22 and C 30). With the cooperation of Montgomery County and the U.S. Corps of Engineers, the trail should be threaded through the edges of the Dalecarlia Reservoir property to connect with the Capital Crescent Trail. Rough construction estimates for this work come to about $1.5 million, a little more than twice the sum estimated by the Coalition for the Capital Crescent Trail but a small fraction of the land purchase cost.

At the south end, as the railroad grade drops from the Canal down to the level of K Street, a paved trail is recommended, and cyclists should be encouraged to leave the towpath and approach the future esplanade along the Georgetown waterfront (see project C 21). This would leave the towpath for pedestrian use only, since it is both narrowest and most heavily used through Georgetown. The new trail below the Canal would also open up access to the shoreline of the Potomac River. Careful consideration should be given to the connection to Key Bridge (see project C 11). See Georgetown Branch Trail Corridor, page 89.

E 10 Fort Circle Hiker-Biker Trail Improvements

This 7.5 mile gravel trail joins Forts Mahan and Stanton through Fort Dupont, just east of Anacostia. The steep topography and soft surface mean erosion is a constant problem. About 80 percent of the trail is satisfactory. Park staff developed in 1987 a detailed improvement plan, including erosion control and prevention, consistent motorbike prohibition signs, curb cuts, trail directional signs, and minor trail relocation. In addition,



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THE GEORGETOWN BRANCH TRAIL CORRIDOR

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the trail's southern end should be extended both west toward W Street at the Frederick Douglass Home (as part of the Black Heritage Trail) and east to Alabama Avenue to allow a comfortable, on-street crossing of the Suitland Parkway. Currently, some of this trail's connections at the south end are unresolved and lead nowhere.

The park's 1987 proposal totalled an estimated $184,000 ($250,000 gross). The principal parts of the proposal included:

signing, curb-cuts, and trail relocation near Reservation 500;

a 750-foot trail connection joining Kenilworth Park, Watts Branch, and Fort Mahan;

a 1,000-foot trail connection from Fort Stanton to Suitland Parkway;

repair of severely eroded culverts at Pennsylvania Avenue;

curb cuts, removable barriers, and erosion repair at 28th Street;

connecting trails to Stoddert Recreation Center and Fort Chaplin;

waterbars and check dams to halt erosion north of 27th Street and Texas Avenue;

signs, curb cuts, barriers, and erosion repair near Fort Chaplin;

landscape screening alongside Fort Davis;

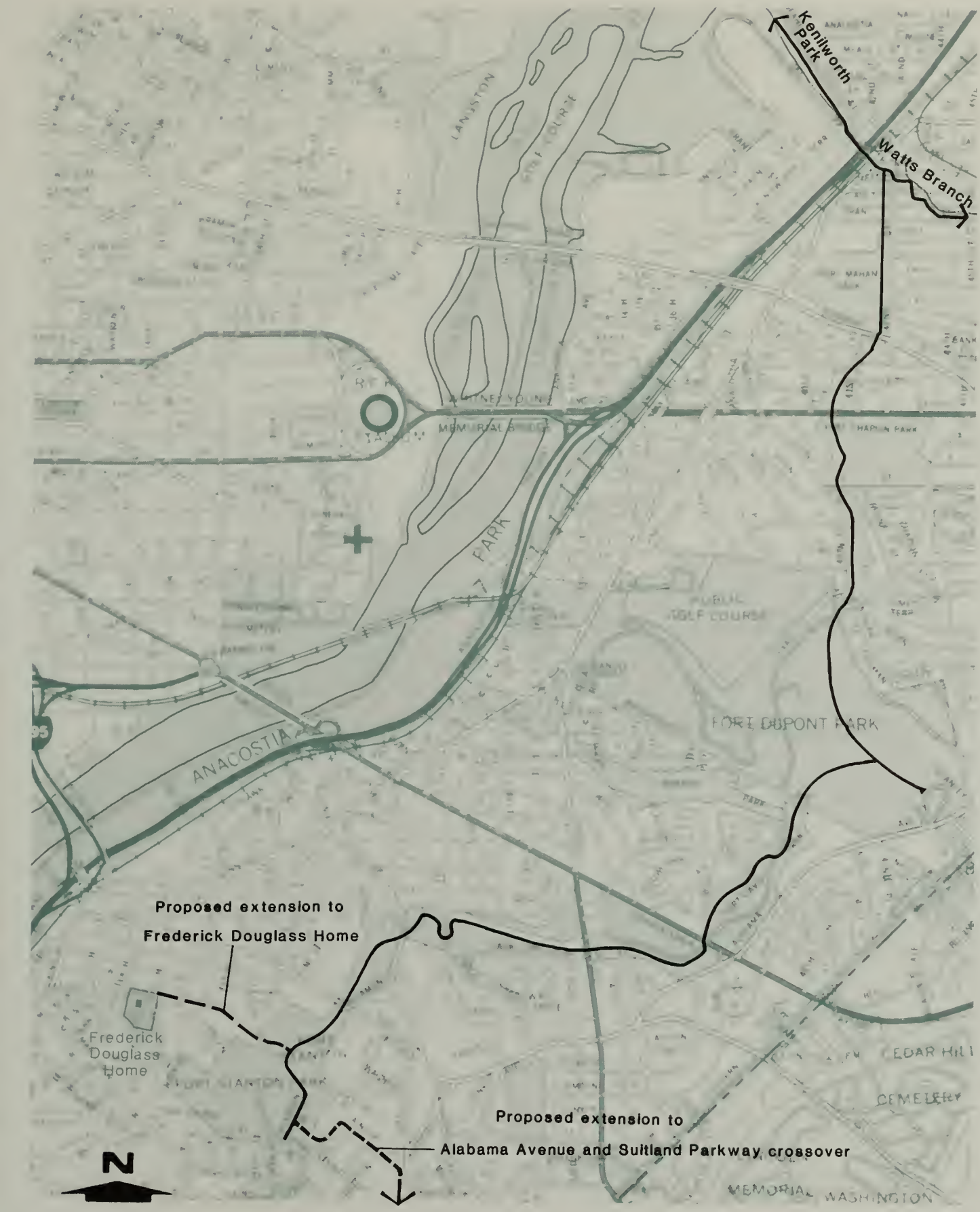
bridge repair at Good Hope Road.

The WABA study noted that this gravel trail is unique in the Washington area, since it is midway between a paved all-users' trail and an earthen walking trail. It is ideal for all-terrain "mountain bikes" but not at all suitable for thin-tired 10-speed bicycles. Rehabilitation is recommended to augment the trail's value for mountain bike riding. Consultation with the local Urban Nomads All-Terrain Bicycle Association can identify ways to improve this trail based on mountain bike projects across the country. Once improved, it could be publicized as Washington's (and the nation's) first urban all-terrain bike trail. Such publicity could be in the form of a brochure explaining the meaning of many of the route's historic sites and indicating connections to adjoining trails. Parking areas for bikers could be designated at the Anacostia Museum in Fort Stanton, at Fort Dupont, and in Kenilworth Park.

In the long term, investigation of other portions of the 27-mile Fort Circle System for multi-purpose trail use is recommended. The current problems at river and railroad crossings, high-volume city streets, and rough topography all stand in the way of an easy solution to developing Washington's "emerald necklace." See The Fort Circle Hiker-Biker Trail, page 91.

M 22 Lincoln Memorial Circle Ramp Crossings

At the east end of Arlington Memorial Bridge, the sidewalks cross entrance and exit ramps connecting to the Rock Creek and Potomac Parkway. Traffic moves onto these at high speed, and sometimes it is difficult for pedestrians and cyclists to get safely across.



THE FORT CIRCLE HIKER-BIKER TRAIL

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A traffic study is recommended to re-evaluate the flow of cars, cyclists, and pedestrians. Poor sight lines and irregular crossings should be specially noted. The recommendations of such a study need to address warning pedestrians about bicycle traffic around the Lincoln Memorial. This might be done with signs or a delineated route. Such a study is estimated to cost about $15,000-$20,000.

Some possible solutions to the situation may include installing discrete warning signs to encourage motorists to watch for pedestrians and bicycles crossing, widening curb cuts for easy maneuvering, and clearly striping the pavement. Rumble strips of cobblestone framing the crosswalks would further encourage automobiles to slow down, without creating unsightly warning devices in this scenically sensitive monument area. The cost for such work is low, compared to heavy construction, and would probably total less than $50,000. See Lincoln Circle Trail Connection, page 93.

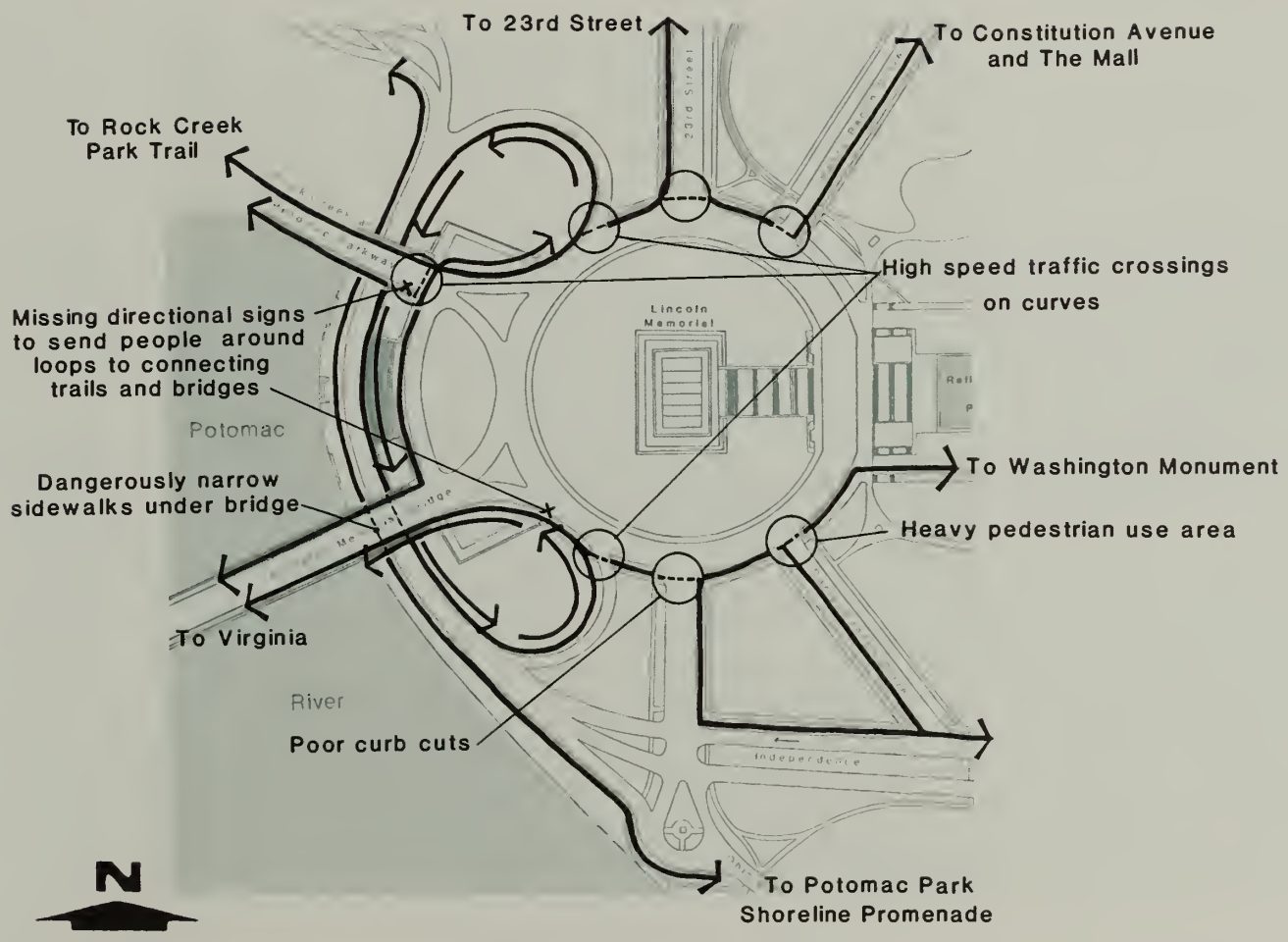
E/G 40Trail Connection Across the Woodrow Wilson Bridge

Including a trail crossing at the Wilson Bridge would provide a critical link in the area's trail network. The crossing would connect the Potomac Heritage Trail in Prince George's County to the Mount Vernon Trail and also be the southern end of a loop trail following both sides of the Potomac River south from Key Bridge. It would also allow an alternative to motor access between the proposed Port America development and Alexandria.

Although the National Park Service has long proposed and advocated this connection, the responsible highway agencies have insisted that the expense ($15 million by one estimate) was not justified until the trails on the east side were built. Currently the agencies involved are searching for ways to enhance the motor vehicle capacity of Wilson Bridge. Although this project lies outside NPS jurisdiction, both ends of the bridge cross shoreline park lands (Oxon Cove and Jones Point). Therefore the National Park Service should monitor planning for the rehabilitation, enlargement, or replacement of the Wilson Bridge and insist that new work enable non-motorized vehicles and pedestrians to cross the river. Such vigilance has already resulted in the requirement that a trail deck be a design element for the current engineering competition. Until the designs are chosen, determining costs is impossible – although the cost of a deck that is part of a new bridge is much lower than the cost of adding a deck to the existing bridge.

Once Port America is built, a significant demand by commuters for non-automobile alternative routes between Alexandria and Prince George's County is likely. In such an event, U.S. Department of Transportation funds might be made available for this trail link across the Potomac River. See Woodrow Wilson Bridge, page 95.

In summary, those projects that are selected for implementation should be announced in the *Federal Register*. Appropriate public involvement and compliance with applicable laws and regulations would accompany the planning and design of these projects. The larger projects would be accomplished through the appropriate Park Service design and construction process, while the smaller ones could be accomplished by the individual park.



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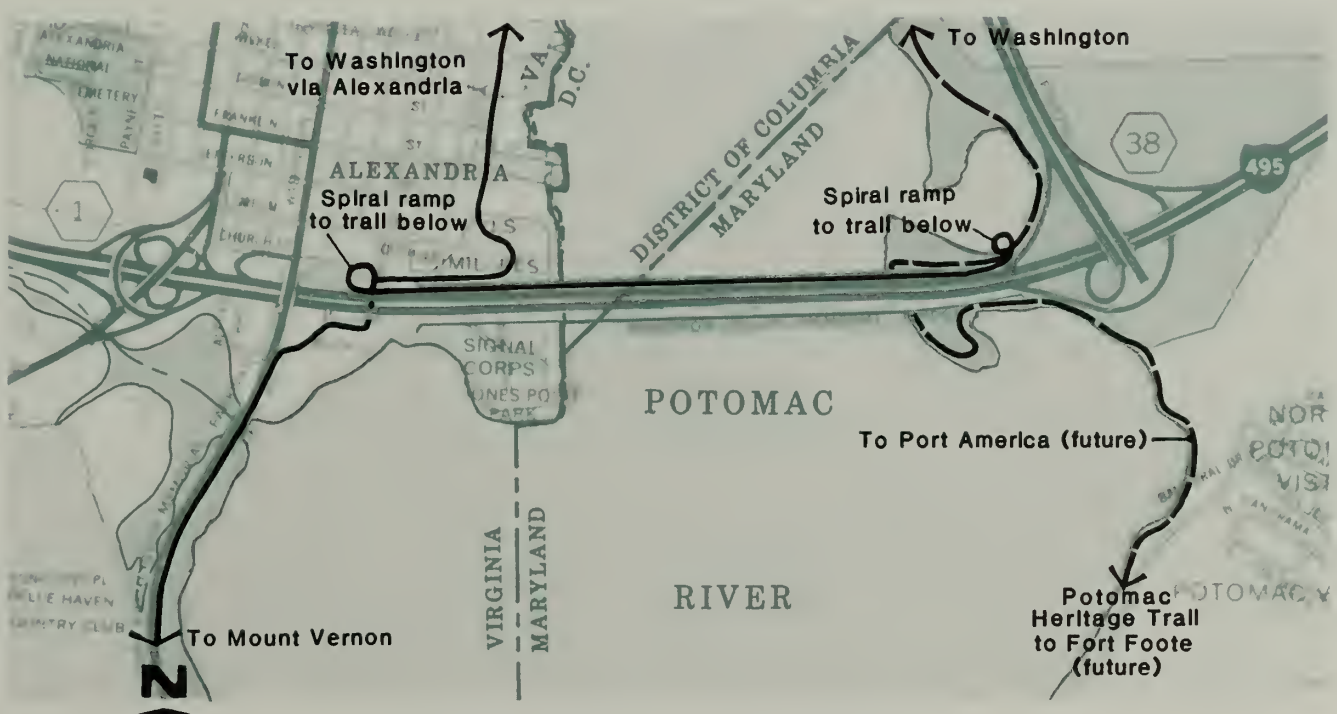

WOODROW WILSON BRIDGE

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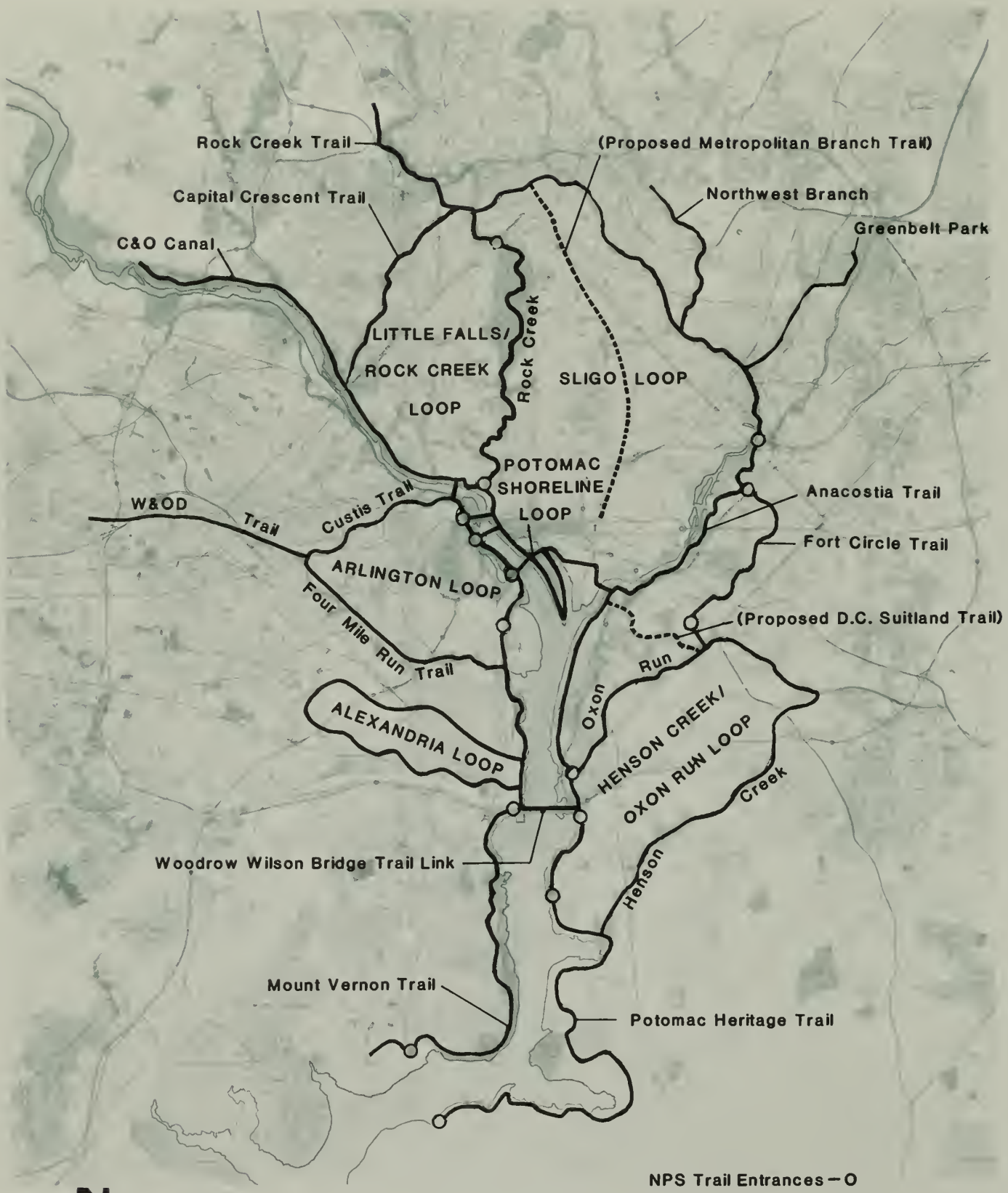

PROPOSED METROPOLITAN LOOP TRAIL SYSTEM

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VII. CONCLUSION

Carrying out the recommendations made in this report will require much effort and many years. Clearly, there is a great deal of work ahead. And the costs are sizable – but so are the benefits. The signs are encouraging for some of the work has already begun.

WORK UNDER WAY

Individual parks have already begun to work on some of the projects listed in the previous chapter, enlarging curb cuts, replacing grates, controlling erosion, and repaving. National Capital Parks-Central, for example, has begun to replace the unsafe drainage grates in East Potomac Park as funds allow (project M16). Critical bridge and erosion control projects are under way along the Fort Circle Hiker-Biker Trail (E10). Several of the worst curves and grades on the Mount Vernon Trail are being improved as part of the Parkway reconstruction (G13).

Other projects are being undertaken in connection with long-term road repair and rehabilitation. For example, an engineering survey of Rock Creek Park, conducted for the Federal Highway Administration in 1988, lists these four improvements that affect paved trails as part of a $12 million package: a grade-separated intersection at Shoreham Hill (R20, FHWA priority 1), signs and other trail improvements L Street to P Street (R21, FHWA priority 5), bridge and trail repairs near Tilden Street (R13, FHWA priority 8), and widening the Zoo tunnel bridge (R12, FHWA priority 11). Work on these projects is scheduled for 1995-97.

Cooperation has in some cases already begun. For example, negotiations have been completed to open up the Crystal City Connector tunnel (G32), with work being shared by the George Washington Memorial Parkway staff, the Washington Metropolitan Airport Authority, and the Federal Highway Administration.

One example of progress by outside agencies, described briefly in the preceding chapter, is the fact that the interstate commission responsible for enlarging or replacing the Woodrow Wilson Bridge has made incorporating a pedestrian/bicycle deck a requirement of its engineering design competition.

Another sign of progress is the integration, for the first time in the history of the metropolitan area, of a comprehensive bicycle trail plan into regional transportation planning. This work is being carried out by the COG Bicycle Technical Advisory Subcommittee. The plan recognizes the dozens of miles of trail already in existence, incorporates policies that recognize the value of bicycling and other non-motorized means of transportation, and lists projects that overlap, in part, with those listed here.

OPPORTUNITIES

The total cost to the National Park Service for the 11 priority projects is roughly estimated at between $3.2 and $4.1 million, excluding the cost of purchasing the CSX corridor in the District of Columbia, FHWA work on Columbia Island, and improvements to the Woodrow Wilson Bridge. Complementary information programs and trail widening and striping adds an additional $1.7 million. This sounds like a lot of money – until the figures are compared to the cost of building one mile of highway ($3 million-$8 million),

a new visitors' center ($1 million-$3 million), or even one comfort station ($100,000 to $500,000).

The investment, though sizable, is one that stands to benefit the entire metropolitan area. Now is a time of great opportunity, for National Park Service trails could form the backbone of six scenic, interjurisdictional trail loops that could bring recreational trails within reach of most of the area's population.

Even as this report was being written, interest in paved trails has continued to grow. New corridors are being identified, such as the Metropolitan Branch trail along the CSX railroad connecting Silver Spring to downtown Washington. The successful acquisition of the abandoned CSX Georgetown Branch in Montgomery County and the District of Columbia is an encouraging indication of public support and increasing Congressional interest.

All indications point to a bright future for paved trails. Now is the time to transform trails in and around the capital into the nation's finest urban network.

APPENDIX A

Estimated costs

Clearly the most expensive of the recommended actions involve on-ground construction work: trail widening and striping. Such work would total about $1.5 million for all NPS paved trails in the D.C. metropolitan area. Some of the other recommended program actions, such as the manuals and education programs, involve already funded staff. The remaining suggestions – signs, maps, and brochures – total about $60,000 for an initial system. These figures are gross NPS class "C" estimates in 1990 dollars, and are provided only to give an impression of the relative scope of expense involved to implement the recommendations.

Some representative costs:

The following sampling of individual cost components provides a sense of the range of expenses that may be encountered in implementing portions of the plan.

Trail widening and striping

To stripe 30 miles of trail, at both edges and the centerline would, at $.50 a foot, cost $238,000. Striping the centerline only would cost about $80,000. The cost of widening and striping all trails in the system is estimated at $1.5 million;

Signs

The cost of installing a set of signs at a major trail intersection or bridge crossing is estimated to be $500 per set.

Park entrance signs are estimated to be supplied at an average cost of $200 per sign.

Brochures

Initial printings of brochures cost about 25 cents a copy; subsequent runs cost less if the same artwork is used. (Six brochures, at an initial run of 20,000 each, would cost $30,000; a sample project, such as "Scenes from the Life of George Washington," with a map/ brochure and 20 trailside interpretive signs would cost about $10,000.)

The cost of initiating better information systems is estimated at $60,000.

APPENDIX B: A BRIEF HISTORY OF WASHINGTON'S TRIALS

The District of Columbia was established in 1790 along the scenic banks of the Potomac River. Today the heart of the city lies at low elevations near rivers, while the outlying parts of the city and its suburbs are nestled in the surrounding hills and stream valleys. Federal park land in metropolitan Washington was first set aside when the city was founded. Since then, thousands of acres have been reserved for parks, much of it on stream valley, river shoreline, or sloping land unsuitable for construction. Trails built on these lands are often troubled by problems of steep topography, poor drainage, erosion, and instability. Such factors constrain the level and types of use, yet the demand for trails continues to steadily increase.

Paved off-road trails originated in Europe in the 1930s and became popular in this country only in certain recreation-minded communities, such as Coral Gables and Palm Beach, Florida; Dayton, Ohio; Waukesha and Milwaukee, Wisconsin; Chicago, Cleveland, and New York City (Cook, 1965).

In the National Capital Region of the National Park Service the first multi-use paved trails were built in Rock Creek Park in response to citizen requests for such trails in 1969. These consisted of a loop system in the northern part of the park near Bingham Drive and Oregon Avenue. In 1971 a scheme was approved in which one of the lanes along the Rock Creek and Potomac Parkway was to be closed to cars to accommodate cyclists coming downtown. The opening of this arrangement coincided with traffic back-ups caused by a broken water main. The ensuing public pressure to get bicycles entirely off the road released some $50,000 of emergency funds, and a paved trail was quickly installed over an existing bridle trail between Thompson's Boathouse on the Potomac River and Cathedral Avenue.

In 1972 civic groups around Mount Vernon petitioned that a recreational trail be installed along the Potomac shoreline parallel to the George Washington Memorial Parkway and south of the paved shoreline walkway that already existed between the Arlington Memorial and 14th Street bridges. Until 1970, cyclists travelled on the Parkway itself; on Sundays the northbound lanes were closed for use as a recreational route. The first section of new trail to be laid out continued south from the 14th Street bridges to Alexandria, weaving alongside National Airport.

Later in 1972, with strong political support, the rest of the trail to Mount Vernon was installed by park crews. Initially gravel, both sections were paved by 1975, often without desirable improvements in grading and alignment. To prevent erosion, the steepest slopes were the first areas paved. The bridges were made of locust posts, inspired by local wharf construction. Most of the trail, laid out before national bicycle trail standards were available, was designed to minimize the removal of trees. The final section of the Mount Vernon Trail near Alexandria was built in the late 1970s to minimize bicycle-motorist conflicts along West Drive. This followed a study and recommendations by Barton-Aschman Associates in 1977. In 1988 the final northern extension of the Mount Vernon Trail was completed from Memorial Bridge to Roosevelt Island. Today the trail has become the "flagship" of recreational trails throughout the country, used to develop new trails standards and as a place to test materials.

Cycling on the C & O Canal has been popular for over a hundred years. Note the cyclists at the Great Falls Tavern in this 1890 photo.

Since the invention of the bicycle in the 19th century, the C & O Canal towpath has been a popular place to ride. After the federal government established the canal as a historic corridor and restored the towpath, local residents sought better access to it from nearby communities. Around 1977, three spiral bicycle bridges were built in the Glen Echo area to carry pedestrians and cyclists across what is known today as the Clara Barton Parkway and the canal to the towpath. Today the Canal extends 180 miles to Cumberland, Maryland. North of Seneca, the towpath is often too rough for bike wheels. But between Seneca and Washington, D.C., it enjoys year-round use by many types of cyclists, walkers, joggers, and strollers.

Also during the 1970s, in conjunction with the nation's Bicentennial, parts of the Fort Circle Park system in National Capital Parks--East (NACE) were cleared and graded for multi-use trails. This implemented a series of trail plans which were drawn up in the 1950s, 60s, and early 70s for the Fort Circle parks. Unfortunately, the funds earmarked for these trails were transferred at the last minute to cover Bicentennial cost over-runs on the Mall and in Constitution Gardens, so the trails in NACE remain mostly gravel – too rough for general bicycle use, although ideal for mountain bikes.

At Oxon Cove in the 1970s, while parts of the park were still being used as a landfill, commuting cyclists were using some of the access roads and a causeway through the park. When the causeway was removed by a landfill contractor when his operations ceased in the park, these cyclists petitioned to have a recreation trail built to replace it. This was done in 1978, resulting in a trail which connects communities near Indian Head Highway to D.C. Village and government installations along the river. Using this as a nucleus, the Park Service has studied various ways to link Fort Foote, the Woodrow Wilson Bridge, and Oxon Cove to the city. Such trails could become part of the proposed Potomac Heritage National Scenic Trail.

In 1979, the area's NPS paved trails were systematically examined in Barton-Aschman and Associates' report, "Bikeway Planning and Design Manual." It addressed the bicycling aspects of the area's federal trails, citing standards as well as making recommendations for ways to solve specific problems. In many ways that study covered the same ground as this study by listing existing trails, by discussing problems (then as now, user conflicts were the major ones), by establishing goals (increased safety being the top priority), and suggesting future planning priorities. Like this study, it was concerned with the connections to other trail systems and with better monitoring and evaluation systems. It also discussed low-cost ways of establishing one-way and two-way bike routes on existing streets. However, it did not recommend an action plan to carry out its recommendations.

Trail work in the 1980s has attempted to complete missing links and improve problem areas, as well as improve signs and waysides. The most imaginative project occurred in 1982-3 to place the Mount Vernon Trail between an electrical generating plant and the Potomac River north of Alexandria. In the face of legal action after many years of storing coal on federal land, the utility company set up a compensation fund which paid for this work.

In 1983, as part of the legislation establishing the five-cent a gallon federal gasoline tax, the Federal Lands Highways Program (FLHP) was initiated. A number of road and parkway projects have been completed with this money, including several improvements along the George Washington Memorial Parkway at Fort Hunt and Mount Vernon. The engineering studies for these projects considered the relation of paved trails to the roads' redesign; however, the use of these funds for trails projects has been severely restricted within the Park Service. The most costly trail and bridge project so far ($1.5 million), the

extension of the Mount Vernon Trail connecting Arlington Memorial Bridge north to the parking lot at Theodore Roosevelt Island, was accomplished through other funding. This segment completes a 17-mile loop in Arlington County joining the Washington & Old Dominion (W & OD) system and the Custis Trail along I-66 with the Potomac shoreline.

In 1984, a pedestrian/bicycle underpass was built connecting Crystal City to the George Washington Memorial Parkway as part of an Arlington County site plan approval. It is not yet open, since the connections at either end have not been built, but offers a promising link between the high-density residential and office development of Crystal City and the Mount Vernon Trail and National Airport.

APPENDIX C: TRAIL SYSTEMS IN OTHER CITIES – A SAMPLING

The following cities were surveyed about their trail systems to ascertain the types of problems and solutions they have encountered. The survey helped to provide a broader perspective of the level of use and interest there is in multi-use trails nationwide.

Boston, Massachusetts

The metropolitan Boston area has about 32 miles of multi-use trails and another 11 miles planned for construction in 1989. During the 1970s trail use rapidly increased, but in the 1980s use has grown more slowly. User surveys show that the percentage of use by commuters has increased substantially in recent years. The most common user conflicts are those between cyclists and dogs and between cyclists and pedestrians. Speed limits of 5 miles per hour are posted in some areas, but they are not enforced. Certain areas have parallel paths with signs requesting cyclists to use one and pedestrians the other -- this is not enforced either. The Boston police now patrol the trails in cars, but park police plan to begin patrolling them by bicycle.

Boulder, Colorado

Boulder has 10 miles of multi-use trails. Five miles comprise a continuous linear park along Boulder Creek. The rest of the system is mostly made up of trail links between on-road routes. The city is planning to build another 40 miles of trail in the near future. The objective in Boulder is to provide a pleasant, hassle-free system of trails for both recreationists and commuters, eliminating as much interaction with cars as possible. AASHTO guidelines are used where feasible, but existing infrastructure limitations prevent full compliance. Conflicts between cyclists and pedestrians are common. Approximately half of all users are pedestrians – an increasing number of them on skateboards, roller blades, and roller skates.

For the past two summers, Boulder police on mountain bikes have patrolled the trails and issued tickets to pedestrians for not staying to the right, and to cyclists for not giving audible warning when passing and not using lights at night. The city would like to have friendly enforcement patrols made up of volunteers, but their volunteer pool so far has not been large enough. Volunteers collect data and educate automobile drivers about bicycles and pedestrians. These volunteers go to schools, businesses, and trucking, cab, and bus companies. They also teach clinics on how to prepare for year-round bicycle commuting.

Cleveland Metroparks, Ohio

The Cleveland Metroparks operate 60 miles of trails that form an "emerald necklace" greenway park system around Cleveland, connecting 12 major park reservations. Completion of another nine miles is anticipated in 1989. The first five miles were built in 1973 in response to the growing number of cyclists who were then using park roads. The decision was made to separate hikers and bikers from cars to provide for greater enjoyment and safety. Currently, most users must drive into the valleys where the trails are located. Cleveland Metroparks hopes to construct connecting trails up the valley walls to enable surrounding residents to cycle directly from their communities.

Pedestrians outnumber cyclists about three to one, and all usage appears to be increasing – especially the number of adults who are walking for fitness. Congestion in some areas is so high that cyclists are shifting back to the road system. In problem areas, trail signs ask that pets be leashed and kept off the trail surface. Metroparks is planning to eventually install trailhead "etiquette" signs. During the peak season, ten seasonal rangers patrol the 60-mile system. To qualify for state or federal funding, Metroparks is increasing the standard trail width to 10 feet.

Eugene, Oregon

The Eugene multi-use trail system began in 1971 when city residents expressed a need for more convenient and safer access to the city's parks. Now there are 21 miles of trails, with another 10-15 miles planned for the near future. Although most of the trails were originally built as linear recreational routes along rivers, they have also become important commuting corridors. Now the city is working on providing a well-integrated system of on-road bike routes and off-road trails that give the community good bicycling access to both employment and recreation. In general the AASHTO design guidelines are used, although the city has adopted a 12-foot width for all paved trails. Trail width began at 8 feet in the early 1970s, progressed to 10 feet in the late 1970s, and is now 12 feet due to the high levels of use and user conflict. The city has installed permanent bike counters that show a steady increase in use. An increase in walking clubs has also been observed. The greatest user conflicts occur on the oldest riverfront trail which is still 8 feet wide and curvy. Many cyclists exercise there, travelling at high speeds and causing accidents with pedestrians. The city has installed caution and warning signs along winding trail sections. It is also installing signs with the following messages: "Ride right – pass left," "Give warning when passing," and "Keep dogs on leash."

Madison, Wisconsin

The trails in Madison were started in response to the explosion of bicycle use following the 1973 oil crisis. The city now has 20 miles of trails and hopes to construct another 10 miles in the next ten years. The trail system is designed to function primarily as a transportation system. Madison's objective is to make the entire city accessible by providing an integrated system of bike trails, striped on-road bike lanes, and signed on-road and on-sidewalk routes. The city adheres to the AASHTO bikeway guidelines, with most trails at least 8 feet wide. In heavily used areas the trails are being widened to 10 feet.

Although most of the system is used primarily by bicyclists, the stretches of scenic trail in the parks receive the most pedestrian use. It is in these locations that the most conflicts occur, although there are few reported accidents. For the past ten years the city has had six to eight civilian bicycle monitors patrolling roads and trails on bicycles and issuing traffic citations to bicyclists. These monitors, who are employed by the city police department, patrol from April to September. The city uses community volunteers to participate in bicycle education programs. There are also a volunteer pedestrian/bicycle committee and bicycle club advocacy committee.

San Diego, California

The bicycle system of this large sprawling city covers over 400 square miles. In this system, there are 20 miles of off-road multi-use trails. The first of these was built in 1920 as an oceanfront promenade that has evolved into a busy multi-use trail. An additional 19 miles of trail are proposed. The primary purpose of the system is to encourage nonmotorized transportation. The city uses the California Department of Transportation Bikeway Standards, which vary slightly from the AASHTO guidelines – but also recommend an 8-foot minimum trail width. Most trail use appears to be recreational, and the number of pedestrians is increasing. Most of the trails along roads function primarily as commuter routes. Conflicts between pedestrians and cyclists are common, particularly along narrow, heavily used sections. The city has provided separate pedestrian and bike paths along a popular stretch of the oceanfront walk. The pedestrian section is designed to have a bumpy, cobblestone effect to discourage crossovers. Police on bikes patrol the oceanfront walk during peak season. Mission Bay Park uses stencilled messages asking for courtesy and limited speeds. The city is currently considering signs asking cyclists to yield to pedestrians and to give audible warning before passing.

Seattle, Washington

The 30-mile Seattle trail system was launched about 1976 and continues to grow rapidly, with another 30 miles planned during the next three years. Many of the trails were first built as linear parks on old railroad lines with the primary purpose of preserving public access to waterways. Now the city is striving for a comprehensive interconnected system for all users that is both safe and scenic. AASHTO design guidelines are used, although all trails are to be 12 feet wide if at all possible. During peak use times, trails are quite congested and have reached capacity. Recently, no increase in use during peak periods has been observed though non-peak use increases each year by 100-120%. Pedestrians and cyclists both use the trails, and the number of walkers seems to be growing. The linear trails have about 80% cyclists and 20% pedestrians, a proportion that is reversed on shorter loop trails.

The major conflicts are caused by cyclists speeding, dogs on the trail, and pedestrians walking two or three abreast. In response to these conflicts, signs are being installed: "Stay right," "Bikes yield to pedestrians," "Bikers use voice when passing," and "Faster cyclists: please use parallel road route." A new one-mile trail is being planned for next year with separate bicycle and pedestrian paths. The city has an active volunteer Bicycle Advisory Board that helps identify priorities and review development plans. Other volunteers help coordinate projects with neighborhoods, provide landscaping, participate in clean-up days and adopt-a-park programs, help on trail safety days in schools, and staff trailside information booths.

APPENDIX D

POTOMAC PEDALERS TOURING CLUB, INC.

Resolution by
Potomac Pedalers Touring Club
in support of
Improvements in the Hiking and Bicycling Trail System
Managed by the National Park Service
in the National Capital Area

Whereas the National Park Service manages several of the most important hiking and bicycle trails in the National Capital Area, including the Mt. Vernon Trail, the Rock Creek Bike Path, and the C & O Canal towpath in the C & O Canal National Historic Park;

Whereas these National Park Service facilities not only are key components of the regional system of hiking and bicycling trails but also are among the most popular local facilities for both bicycle commuting and for recreational use by area residents as well as the approximately 20 million visitors and tourists to the National Capital Area each year;

Whereas hiking and bicycling are among the most popular of recreational activities nation-wide and in the National Capital Area;

Whereas enhancing the system of hiking and bicycle trails would also provide an alternative form of transportation and assist in easing highway congestion at minimal cost;

Whereas three basic problems are presented by the existing National Park Service system of hiking and bicycle trails within the National Capital Area: (1) The existing facilities are only a foundation for a genuine network. A number of extensions and additions are vital to provide basic and safe pedestrian and bicycle access to most neighborhoods, communities, and places of work in the Area. (2) Many of the existing facilities are overcrowded, and need reconstruction and rehabilitation to meet demand safely and to comply with applicable standards published by AASHTO and sanctioned by the Federal Highway Administration. (3) All the facilities have missing links, missing connectors, unsafe intersections, unsatisfactory or missing bridges, and so forth. A report describing individual instances of these

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problems was issued in 1988 by the Washington Area Bicyclist Association; and

Whereas Potomac Pedalers Touring Club (PPTC) is the largest local recreational bicycle touring club in the United States, with members in Maryland, Virginia and the District of Columbia, and with important interests in maintaining and improving existing bicycle trail resources, and in providing additional recreational resources to meet expanding needs,

Be it therefor resolved, by the Executive Committee of PPTC, as governing body of PPTC and on behalf of the members of PPTC, that:

1. PPTC encourages the National Park Service, its National Capital Region, and the various Park Superintendents to make a concerted effort to upgrade existing bicycle facilities better to serve the needs of area residents as well as the millions of visitors to the National Capital Area. All upgrades as a minimum should meet the safety and design standards for bicycle paths issued by AASHTO or comparable standards.

2. PPTC encourages the National Park Service through its National Capital Region to increase its efforts promptly to construct connectors, missing links and missing or inadequate bridges; to improve dangerous intersections; and to widen or to construct new facilities where necessary in order to decrease congestion and user conflicts, and to increase safety.

3. PPTC supports increased appropriations by Congress on an annual basis to permit the National Park Service/National Capital Region to complete and to upgrade the existing system of bicycle trails managed by the National Park Service, and, as expeditiously as possible, to construct the many "missing links," missing connections, and missing or inadequate bridges which currently confront recreational and commuting users of the Park Service's trail system.

4. PPTC encourages all local jurisdictions to work together, and with the Park Service, to complete their own portions of connectors and "missing links" so that the vast potential of a regional trail system suitable for recreational and commuting use can be realized.

Adopted: 19-Sep-89. Robert A. Miller, chairman
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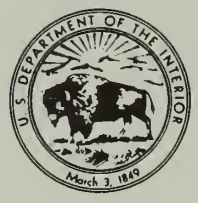

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